Memoria de Actividades

Annual Report

2021-2022

Instituto de Física Teórica
UAM-CSIC

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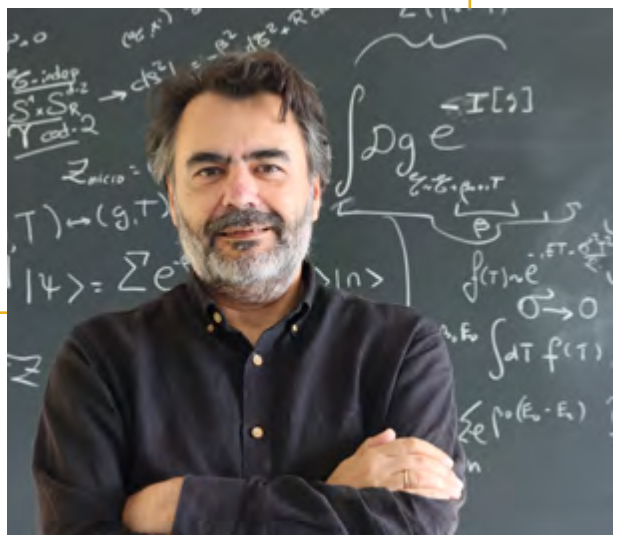
Bienvenida

Welcome



Bienvenida

A word from the director

Los años 2021 y 2022 han sido bastante agitados para el IFT, con los efectos de la pandemia de covid dejándose sentir en las actividades científicas. La vuelta gradual a las prácticas normales no cobró impulso hasta 2022 y las actividades en línea a distancia formaron parte del paisaje durante este periodo y, en cierta medida, seguirán haciéndolo en el futuro. Una muestra de este fenómeno es el ritmo de organización de conferencias científicas en el IFT, que cayó a diez eventos en 2021, siete de los cuales eran totalmente en línea, y se disparó a diecisiete, todos ellos presenciales, en 2022.

Algunos de los aspectos más destacados de esta agitada actividad en 2022 fueron los dos programas ampliados, uno de Física de Neutrinos y otro sobre la interfaz entre la Física de Partículas y la Cosmología. Juntos, estos dos programas reunieron más de un centenar de expertos internacionales trabajando en el IFT durante dos semanas o más. También celebramos nuestro primer encuentro sobre las aplicaciones de la Inteligencia Artificial a la investigación en física fundamental, un primer paso que incluye un acuerdo de intercambio con el Instituto de Inteligencia Artificial e Interacciones Fundamentales (IAIFI) de la NSF en Boston, Estados Unidos.

Todas estas actividades y muchas más fueron posibles, por supuesto, gracias a nuestro tercer Sello de Excelencia Severo Ochoa consecutivo, que inició su ciclo de cuatro años precisamente en enero de 2022. Esto significa que nos espera un período de mayor actividad para nuestros programas de conferencias, visitantes y divulgación.

The years 2021 and 2022 have been quite hectic for the IFT, as the repercussions of the covid pandemic impacted scientific activities, the gradual return to normal practices only gaining momentum along 2022. Online distance teaching, conferences and congresses were part of the landscape during this period and, to some extent, will continue to be so in the future. One measure of this phenomenon is the pace of workshop organization at IFT, which fell to ten events in 2021, seven of which were entirely online, and soared to seventeen, all of which were face-to-face, in 2022.

Some of the highlights of this hectic workshop activity in 2022 were the two expanded programs, one on Neutrino Physics and another on the interface between Particle Physics and Cosmology. These two programs brought together more than a hundred of the world's leading theorists to work at the IFT for two weeks or more. We also held our first workshop on applications of Artificial Intelligence to fundamental physics research, a first step that includes an exchange agreement with the NSF's Institute for Artificial Intelligence and Fundamental Interactions (IAIFI) in Boston, USA.

All these activities and many more were made possible, of course, thanks to our third consecutive Severo Ochoa Excellence Award, which started its four-year cycle precisely in January 2022. This means that we are looking forward to a period of increased activity for our workshop, visitor and outreach programs.

Los años 21-22 también han visto una expansión significativa del contingente de investigadores en el IFT, con la incorporación de nuevo talento que nos hace mirar al futuro con optimismo. Hemos reforzado los grupos de fenomenología de partículas con la incorporación de Juan Antonio Aguilar Saavedra como investigador permanente y la llegada de Javier Serra como investigador Ramón y Cajal. El grupo de cosmología ha visto la llegada de Yashar Akrami como investigador Ramón y Cajal. El grupo de Teoría de la Información Cuántica también ha dado la bienvenida a Alejandro Bermúdez como nuevo profesor permanente y el regreso de Belén Paredes a las filas del profesorado del IFT. Además, Álvaro Martín Alhambra se ha incorporado como Investigador Ramon y Cajal a este grupo. El grupo de teoría formal también se reforzó con la llegada de Juan Pedraza y Miguel Montero como nuevos investigadores de plantilla junior. Finalmente, nuestra responsable de comunicación y divulgación, Susana Hernández, partió en 2022 hacia nuevos retos después de muchos años de servicio sobresaliente, y tuvimos el placer de recibir a Laura Marcos Mateos, que está imprimiendo nuevos impulsos a este puesto de gran importancia para el IFT.

Entre las muchas iniciativas que han enriquecido la vida del Instituto, nos gustaría destacar el programa de divulgación del IFT, con nuestro afamado canal de YouTube, que alcanza ya los 700.000 suscriptores en todo el mundo, y otras iniciativas transversales como el programa "Parámetros para la comprensión de la incertidumbre" que exploró las fronteras entre el arte y la ciencia bajo la dirección de la profesora de la Universidad de Edimburgo Rebecca Collins y el miembro del IFT David Cerdeño.

Un logro de gran importancia ha sido la consolidación de nuestro Comité de Equidad, Diversidad e Inclusión (EDI-IFT) cuya creación y Plan de Acción fue aprobado oficialmente por el claustro del IFT en 2021 y sus numerosas actividades, que van desde encuestas de diagnóstico a una página web informativa y los esfuerzos de divulgación con perspectiva de género han merecido el reconocimiento, no sólo desde dentro del Instituto, sino también externamente, con el Premio Accesit Igualdad del CSIC otorgado al IFT en su edición de 2022. Enhorabuena a los miembros de comité EDI por este éxito.

Por último, me gustaría agradecer a todos los miembros del IFT, desde el personal de administración y servicios hasta todos los científicos por su inestimable ayuda, y muy en particular a Luis Ibáñez Santiago, director del IFT hasta el otoño de 2021 y a Carlos Pena Ruano, actual vicedirector.

José L. F. Barbón

Director

Years 21-22 have also seen a significant expansion of the faculty contingent at IFT, with the arrival of new talent that fills us with optimism towards the future. We have strengthened the Particle Phenomenology groups with the addition of Juan Antonio Aguilar Saavedra as a permanent researcher and the arrival of Javier Serra as a junior faculty researcher. The Cosmology group has seen the arrival of Yashar Akrami as junior faculty. The Quantum Information Theory group has also welcomed Alejandro Bermúdez as a new permanent professor and the return of Belén Paredes to the IFT faculty ranks after a leave of absence. In addition, Álvaro Martín Alhambra has joined this group as junior faculty. The formal theory group was reinforced with the arrival of Juan Pedraza and Miguel Montero as new junior faculty. Finally, our head of Communication and Outreach, Susana Hernandez, left for pastures new in 2022, after many years of outstanding work, and we have welcomed Laura Marcos Mateos to bring new strength to this crucial position.

Among the many initiatives that have enriched the life of the Institute, we would like to highlight the IFT's outreach program, with our famed YouTube channel now reaching 700,000 subscribers worldwide, and other cross-cutting initiatives such as the "Parameters for Understanding Uncertainty" program exploring the boundaries between science and art, led by IFT professor Rebecca Collins from the University of Edinburg and IFT member David Cerdeño.

A major achievement was the consolidation of our Equity, Diversity and Inclusion Committee (EDI-IFT) whose creation and Action Plan was officially approved by the IFT Assembly in 2021 and its numerous activities, ranging from diagnostic surveys to an informative website and gender-oriented outreach efforts have deserved recognition, not only from within the Institute, but also externally, with the CSIC Accesit Igualdad Prize awarded to the IFT in its 2022 edition. Congratulations to the EDI committee members for this success.

Finally, I would like to thank all members of the IFT, from administration and services staff to all scientists for their invaluable help, and in particular Luis Ibáñez Santiago, director of the IFT until the fall of 2021 and Carlos Pena Ruano, current deputy director.

José L. F. Barbón

Director

PARTE I Presentación

Presentation PART I

Objetivos

Mission Statement

Instituto de Física Teórica UAM-CSIC

El Instituto de Física Teórica (IFT) UAM-CSIC fue creado oficialmente en 2003 como un centro mixto perteneciente al Consejo Superior de Investigaciones Científicas (CSIC) y a la Universidad Autónoma de Madrid (UAM). Es el único centro español dedicado íntegramente a la investigación en Física Teórica.

En el IFT se trabaja en la frontera de la Física de Partículas Elementales, Astropartículas y Cosmología, con el objetivo de entender las claves fundamentales de la Naturaleza y del Universo. Sus investigadores lideran numerosos proyectos de investigación en el ámbito tanto nacional como internacional.

El IFT forma parte de la línea estratégica `Física Teórica y Matemáticas´ del Campus de Excelencia Internacional (CEI) UAM+CSIC establecido en 2009. Desde 2012, está acreditado como Centro de Excelencia Severo Ochoa. Además de la actividad puramente científica, en el IFT se realiza una intensa tarea de formación de jóvenes investigadores y profesionales a través del programa de postgrado en Física Teórica con Mención de Excelencia del CEI y del Ministerio de Educación. También se lleva a cabo una importante labor de transferencia de conocimiento a la sociedad a través de diversos programas de divulgación.

The Institute for Theoretical Physics (IFT) UAM-CSIC was officially created in 2003 as a joint research center belonging to the Spanish National Research Council (CSIC) and the Autonomous University of Madrid (UAM). It is the only Spanish center dedicated entirely to research in Theoretical Physics.

The IFT members develop research in the frontiers of Elementary Particle Physics, Astroparticles and Cosmology, in order to understand the fundamental keys of Nature and the Universe. They are also leading many research projects, both at the national and international level.

The IFT is part of the strategic line `Theoretical Physics and Mathematics´ of the Campus of International Excellence (CEI) UAM+CSIC established in 2009. Since 2012, it is credited as Severo Ochoa Centre of Excellence. Besides purely scientific activity, in the IFT is also conducted intensive training tasks of young researchers and professionals through the graduate program in Theoretical Physics with mention of excellence from the CEI and the Ministry of Education. In addition, the Institute carries out the important task of transferring knowledge to society through several outreach programs.

La misión del IFT es crear las condiciones y sinergias necesarias para el desarrollo de la investigación de excelencia en la frontera de la física teórica, incluyendo la física de partículas elementales, la física de astropartículas, la cosmología, la gravitación cuántica, la teoría de cuerdas y la teoría cuántica de campos. El objetivo último del IFT es contribuir a la comprensión de las leyes fundamentales de la naturaleza en el microy el macrocosmos. Además de la actividad puramente investigadora, en el IFT se realiza una intensa tarea de formación de jóvenes investigadores y profesionales a través de programas de postgrado, así como una labor de transferencia de conocimiento a la sociedad a través de programas de divulgación.

The mission of the IFT is to create the conditions and synergies necessary for the development of research of excellence in the frontiers of theoretical physics in the areas of elementary particle physics, astroparticle physics, cosmology, quantum gravity, string theory and quantum field theory with the aim to understand the fundamental laws of nature in the micro- and the macrocosmos. Besides purely research activity, the IFT conducts also high-quality training of early stage researchers and professionals through posgraduate programs with UAM, as well as knowledge transfer to the society through outreach activities.

Historia

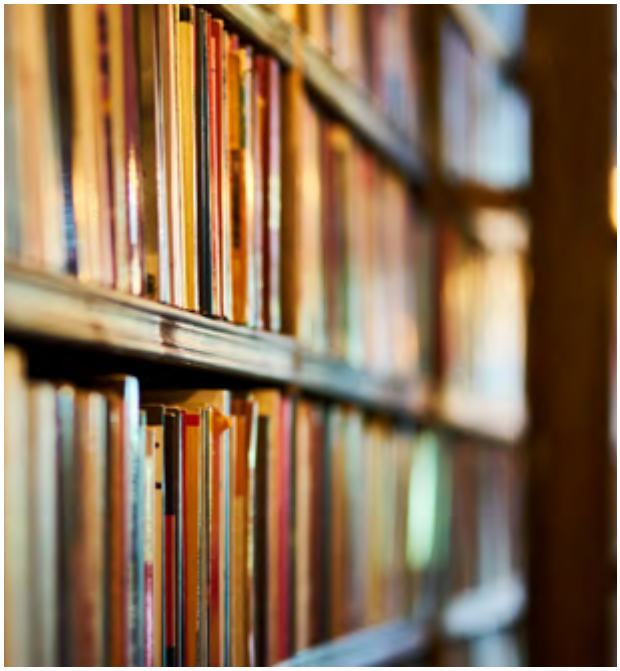
El Instituto de Física Teórica (IFT UAM-CSIC) se gestó en el año 1994 cuando equipos de investigación consolidados pertenecientes a las dos instituciones madre, Consejo Superior de Investigaciones Científicas (CSIC) y Universidad Autónoma de Madrid (UAM), decidieron sumar esfuerzos con objeto de generar sinergias y adquirir la masa crítica necesaria para desempeñar un papel relevante en el escenario internacional de la investigación en el área.

El proceso de creación del instituto pasó por varias fases: Primero se creó un instituto universitario de la UAM del mismo nombre (Abril 1996), que posteriormente se adscribió al CSIC como unidad asociada (23 de Abril de 1998). El 31 de Octubre de 2001 la Junta de gobierno del CSIC aprobó su constitución como Instituto mixto. El convenio de colaboración para la creación del instituto fue firmado por ambas instituciones el 13 de Junio 2002. El 10 de Octubre de 2003 el instituto recibió la notificación de puesta en marcha efectiva.

En cuanto a su ubicación, en los primeros años el IFT ocupó varias dependencias dentro de las instalaciones de la Facultad de Ciencias de la UAM distribuidas en los módulos 8 y 15 (antiguos C-XI y C-XVI). Desde enero de 2011 ocupa una de las alas del edificio del Centro de Física Teórica y Matemáticas (CFTMAT) en el campus de la UAM. Hoy en día, el IFT es un centro de referencia nacional e internacional en Física Teórica. Desde 2009 forma parte de la línea estratégica 'Física Teórica y Matemáticas' del Campus de Excelencia Internacional (CEI) UAM + CSIC y desde 2012 está reconocido como Centro de Excelencia Severo Ochoa, acreditación que ha renovado con éxito en 2017.

History

The Institute for Theoretical Physics (IFT UAM-CSIC) was conceived in 1994 when established research teams belonging to both mother institutions, the Spanish Research Council (CSIC) and the Autonomous University of Madrid (UAM), decided to join efforts to generate synergies and acquire the critical mass to play a role in the international area of research in the field.



The administrative creation process went through several phases: first as a university institute (April 1996), subsequently attached to the CSIC as an associate unit (23 April 1998). On 31 October 2001 the Governing Board of the CSIC adopted its constitution as a mixed Institute. The collaboration agreement for the establishment of the institute was signed by the two mother institutions on 13 June 2002. On 10 October 2003 the institute received notification of effective implementation.

Concerning its location, in the early years the IFT premises were located in the Faculty of Sciences of the UAM Modules 8 and 15 (former C-XI and C-XVI). Since January 2011 it occupies one wing of the building of the Centre for Theoretical Physics and Mathematics (CFTMAT) on the campus of the UAM. Today, the IFT is a centre of national and international reference in Theoretical Physics. Since 2009 it is part of the strategic line 'Theoretical Physics and Mathematics' Campus of International Excellence (CEI) UAM + CSIC and since 2012 it is recognized as a Severo Ochoa Centre of Excellence, a recognition which was renewed in 2017.

Todos estos logros del IFT no hubieran sido posibles sin el esfuerzo decidido de sus investigadores así como de los equipos de gobierno que en distintas etapas han dirigido su funcionamiento. En la tabla adjunta se recogen, en su representación, las direcciones de los mismos así como los períodos correspondientes.

All these achievements would not have been possible without the determined effort of its researchers and governing teams which have led the operation of IFT at its different stages. On their behalf, we collect the directorates of the corresponding periods in the table.

Direcciones / *Directorates*

Nombres / *Names*	Función / *Function*	Período / *Period*
Alfredo Poves	Director / *Director*	1994 - 1997
Enrique Álvarez	Vicedirector / *Deputy director*	
Enrique Álvarez	Director / *Director*	01/1998 - 02/2002
César Gómez	Vicedirector / *Deputy director*	
César Gómez	Director / *Director*	03/2002 - 05/2006
Antonio González-Arroyo	Vicedirector / *Deputy director*	
Antonio González-Arroyo	Director / *Director*	05/2006 - 04/2009
Germán Sierra	Vicedirector / *Deputy director*	
Alberto Casas	Director / *Director*	05/2009 - 08/2012
Carlos Muñoz	Vicedirector / *Deputy director*	
Carlos Muñoz	Director / *Director*	09/2012 - 09/2015
Margarita García Pérez	Vicedirector / *Deputy director*	
Angel M. Uranga	Director / *Director*	09/2015 - 10/2018
Luis E. Ibáñez	Vicedirector / *Deputy director*	
Luis E. Ibáñez	Director / *Director*	10/2018 - 2021
José L. Fernández Barbón	Vicedirector / *Deputy director*	
José L. F. Barbón	Director / *Director*	10/2021-present
Carlos Roberto Pena Ruano	Vicedirector / *Deputy director*	

Investigación ❍ Research

El Instituto de Física Teórica (IFT) tiene como objetivo tres fronteras de investigación en Física Fundamental: la Frontera de Partículas Elementales, la Frontera del Universo y la Frontera Cuántica.

La Frontera de Partículas Elementales incluye el ámbito tradicional de la investigación teórica de la física de corta distancia, tal como se revela mediante las sondas experimentales de mayor energía, como los aceleradores y experimentos de rayos cósmicos.

La Frontera del Universo abarca el ámbito tradicional de la cosmología, desde el Universo temprano, donde tradicionalmente la materia se fusiona con la física de partículas, hasta preguntas centrales abiertas como los problemas de la Materia Oscura y la Energía Oscura.

Finalmente, la Frontera Cuántica se centra en la naturaleza y aplicaciones de sistemas con enormes cantidades de entrelazamiento cuántico, tal como se revela, por ejemplo, en sistemas fuertemente correlacionados de materia condensada, o las preguntas tradicionales planteadas por fenómenos fuertemente acoplados en teoría cuántica de campos, como el clásico problema del confinamiento de quarks.

The Institute of Theoretical Physics IFT targets three research frontiers in Fundamental Physics: the Elementary Particles Frontier, the Universe Frontier and the Quantum Frontier.

The Elementary Particles Frontier includes the traditional realm of theoretical investigation of short-distance physics, as revealed by the highest energy experimental probes such as accelerators and cosmic ray experiments.

The Universe Frontier includes the traditional realm of cosmology, from early Universe, where traditionally the subject merges with particle physics, to central open questions such as the problems of Dark Matter and Dark Energy.

Finally, the Quantum Frontier focusses on the nature and applications of systems with massive amounts of quantum entanglement, as revealed for instance in strongly correlated systems of condensed matter, or the traditional questions raised by strongly coupled phenomena in quantum field theory, such as the classic problem of quark confinement.

The last decades have witnessed the development of a surprising network of synergies between these three frontiers.

Las últimas décadas han sido testigos del desarrollo de una sorprendente red de sinergias entre estas tres fronteras. En muchos casos, esto fue más o menos determinado por la naturaleza misma de los problemas en cuestión, como la física del Universo temprano o el misterio de la materia oscura, que no se sabe si está confinada a las fronteras de corta o larga distancia.

En otros casos, la conexión era menos obvia, como el impacto del descubrimiento de la energía oscura en la construcción puramente especulativa de la teoría de cuerdas; o el descubrimiento de la holografía en el contexto de los agujeros negros cuánticos y la teoría de cuerdas, uniendo la teoría de la información cuántica, la teoría cuántica de campos y la relatividad general.

El IFT está bien posicionado para beneficiarse de este intercambio de ideas entre campos de investigación teórica, ya que cuenta con grupos dinámicos investigando las tres fronteras mencionadas y, además, tiene una masa crítica para beneficiarse de las sinergias relevantes.

In many cases, this was more or less determined by the very nature of the problems at hand, such as the physics of the early Universe or the mystery of dark matter, which is not known to be confined to either the short or long distance frontiers.

In other cases, the connection was less obvious, like the impact of the discovery of dark energy on the purely speculative construction of string theory; or the discovery of holography in the context of quantum black holes and string theory, bridging together the theory of quantum information, quantum field theory and general relativity.

The IFT is well-positioned to profit from this cross-talk between theoretical research fields, since it has dynamic groups poking at the three frontiers we have mentioned and, moreover, it has a critical mass to benefit from the relevant synergies.

PARTE II Organización y Personal

Organization and Personnel PART II

Organización ❍ Organization

El IFT dispone de personal científico y de personal de servicios técnicos y administrativos. El personal científico está formado por miembros permanentes que son profesores de la UAM o investigadores del CSIC, por investigadores Ramón y Cajal, por investigadores posdoctorales y por estudiantes de doctorado.

El personal de servicios se organiza en tres unidades: Servicio de Computación y Tecnologías de la Información (TI), Servicio de Comunicación y Divulgación y Servicio de Administración. En cuanto al equipo de gerencia, este es común a los dos institutos que comparten el edificio, el IFT y el Instituto de Ciencias Matemáticas (ICMAT), constituyendo el centro de servicios del CFTMAT. El personal científico del IFT se estructura en dos departamentos: Departamento de Teoría y Departamento de Fenomenología y Cosmología. El primero está formado por los investigadores que trabajan en los aspectos más formales o matemáticos de la física teórica, mientras que el segundo lo conforman los investigadores más directamente relacionados con los datos experimentales u observacionales

El IFT se rige por el convenio específico de colaboración firmado el 9 de Marzo de 2011 por sus dos instituciones, la UAM y el CSIC. En el mismo se recogen los siguientes Órganos de Gobierno y Asesoramiento:

- Órgano Rector: Comisión Rectora.
- Órganos de Dirección y Gestión: Junta del IFT, director/a, vicedirector/a, gerente.
- Órganos de Asesoramiento: Claustro Científico, Comité de Asesoramiento Externo.

The IFT has a scientific, technical and administrative personnel. The scientific staff consists of permanent members who are professors or researchers of UAM or CSIC, fixed term Ramón y Cajal researchers, postdoctoral researchers and PhD students.

The technical and administrative personnel is organized into three different units: Computing and Information Technology (IT) Unit, Administration Unit, and Communications and Outreach Unit. The Management team is common to the two institutes sharing the building, the IFT and the Institute of Mathematical Sciences (ICMAT), and constitutes the Center of Theoretical Physics and Mathematics (CFTMAT) service center.

For the purposes of scientific organization, the IFT is divided into two departments: Department of Theory and Department of Phenomenology and Cosmology. The former includes researchers working in more formal or mathematical aspects of theoretical physics, while the latter gathers researchers whose work is more directly related to experimental or observational data.

The IFT is governed through the specific collaboration agreement signed on March 9, 2011 by its two host institutions, UAM and CSIC. It defines the Governing and Advisory Bodies:

- *Governing Body: The Board of Trustees.*
- *Management Bodies and Management: IFT Board, Director Vicedirector, Manager.*
- *Advisory Bodies: Scientific Assembly, External Advisory Committee.*

Instituto de Física Teórica
UAM-CSIC

La Comisión Rectora

Es el órgano de dirección superior del IFT y sus funciones incluyen aprobar el plan estratégico cuatrienal y el presupuesto del IFT. Sus miembros no pueden tener la condición de personal adscrito al instituto. Actualmente está integrada por el Vicepresidente de Organización y Relaciones Institucionales del CSIC y el Jefe de la Comisión de Área de Ciencia y Tecnologías Físicas del CSIC, y por el Vicerrector de Investigación e Innovación de la UAM y el Gerente de la UAM. El director del IFT asiste a las reuniones de la Comisión Rectora. El/ La gerente del IFT actúa como Secretario/a.

La Junta del IFT

Está constituida por el/la director/a del IFT, el/la vicediretor/a del IFT, los jefes de departamento y dos representantes del personal. El/La gerente del IFT actúa como Secretario/a

El/La director/a

Sus funciones son las de dirigir, coordinar y supervisar todos las actividades y servicios del IFT, así como ejecutar los acuerdos de la Junta. Su mandato es por un período de tres años, pudiendo ser reelegido.

El/La vicedirector/a

Asiste al/a la director/a en sus funciones. Le sustituye en caso necesario o en funciones delegadas.

El/La gerente

Le corresponde la gestión administrativa y económica del instituto.

El Claustro Científico

Está compuesto por el personal investigador y los doctores adscritos al IFT. Entre sus misiones le corresponde proponer a la Junta las directrices y medidas necesarias para el desarrollo de la actividad científica del IFT.

El Comité de Asesoramiento Externo

Compuesto por científicos de relieve internacional que realizan un seguimiento de la labor científica del IFT.

The Board of Trustees

It is the superior executive board of IFT and among its duties it approves the four-year strategic plan of the institute as well as its budget. Its members cannot have the status of staff assigned to the institute. It is currently composed of the Vice-president of Organization and Institutional Relations CSIC and the Head of the Area of Physics Science and Technology of CSIC, and the Vice President for Research and Innovation of UAM and the Manager of the UAM. The IFT director attends meetings of the Governing Committee. The manager of IFT acts as Secretary.

The IFT Board

It consists of the director and vicedirector of the IFT, the department heads and two staff representatives. The manager of IFT acts as Secretary.

The Director

The Director´s functions are to direct, coordinate and supervise all the activities and services of IFT and to implement the resolutions of the IFT Board. Its mandate is for a period of three years with the possibility of reappointment.

The Deputy Director

He/she assists the director in office. and replaces the director if necessary or when suitable functions are delegated.

The Manager

He/she is responsible for administrative and financial management of the Institute.

The Scientific Assembly

It consists of the research staff and doctors assigned to IFT. Its mission is to propose to the Board the guidelines and means necessary for the development of the scientific activity of IFT.

The External Advisory Committee

It is composed of international renowned scientists that track the scientific work of the IFT.

Junta / *Board*

Cargo / *Responsability*	
Director / *Director*	Jose L. F. Barbón
Vicedirector / *Deputy Director*	Carlos R. Pena Ruano
Jefe de Departamento de Teoría / *Head of Theory Department*	Ángel Uranga Urteaga
Jefe de Departamento de Fenomenología y Cosmología / *Head of the Phenomenology and Cosmology Department*	María Jose Herrero Solans
Representantes de personal / *Representatives of the personnel*	Esperanza López Manzanares Alberto Casas González

Comité Asesoramiento Externo / *External Advisory Committee*

Luis Álvarez Gaumé	Director del Simmons Center for Geometry and Physics, Stony Brook, New York ExDirector y miembro del Grupo de Teoría del CERN *Director of the Simons Center for Geometry and Physics, Stony Brook Former head and staff member of Theory Group at CERN*
Alessandra Buonanno	Directora del Max Planck Institut for Gravitational Physics, Albert Einstein Institute, Potsdam, Germany *Director of the Max Planck Institute for Gravitational Physics, Potsdam*
Graciela Gelmini	Physics and Astronomy, UCLA, Los Angeles *University of California Los Angeles*
Luciano Maiani	Presidente del CNR (Consiglio Nazionale delle Ricerche) Director General del CERN (1999 - 2003) U. Roma 1"
Michelangelo Mangano	Theory Division, CERN, Geneva Director del Centro de Física del LHC *CERN Theory Groupy, Geneva* *Head of the LHC Physics Center*
Fernando Quevedo	Cambridge U. Director del Centro Internacional de Física Teórica (ICTP) (2009-2019) *Cambridge University* *Director of International Centre for Theoretical Physics (ICTP) (2009-2019)*

Comités de Funcionamiento / *Operating Committees*

Igualdad, Diversidad e inclusión *Equity, Diversity and Inclusion*	Rebeca Alameda; Emilio Ambite; Ernesto Arganda; David G. Cerdeño; Pilar Coloma; Margarita García; Manuel González; Sachiko Kuroyanagi; Esperanza López; Xabier Marcano; Laura Marcos; Savvas Nesseris
Estudios de Posgrado / *Postgraduate Studies*	Alejandro bermúdez, David G. Cerdeño; Enrique Fernández; Savvas Nesseris; Fernando Marchesano; Jesús M. Moreno; Carlos Pena; Agustín Sabio
Contrato Posdoctorales / *Postdoctoral Positions*	Karl Landsteiner
Divulgación / *Outreach*	Alberto Casas; David G. Cerdeño; Xabier Marcano; Carlos Pena; Maria J. Rodriguez; Germán Sierra; Ángel M. Uranga
Seminarios y Coloquios / *Seminars and Colloquia*	Juan Antonio Aguilar Saavedra; Daniel Areán; Ernesto Arganda; Guillermo Ballesteros; Pilar Coloma; Matteo Fasiello; Sven Heinemeyer; Gregorio Herdoiza; Sachiko Kuroyanagi; Savvas nesseris; Miguel Ángel Sánchez Conde; Irene Valenzuela
Congresos y Programas / *Workshops and Programs*	Esperanza López
Biblioteca / *Library*	Jose L. F. Barbón
Administración del Cluster / *Cluster Administration*	Emilio Ambite; Gregorio Herdoiza
Memorias Científicas *Scientific Reports*	Ángel M. Uranga

Servicio de Computación y Tecnología de la Información

Este servicio es responsable de la gestión de los recursos de tecnología de la información del Instituto. Una de sus tareas más fundamentales y complejas es la gestión de los recursos de Computación de alto rendimiento (HPC). Estos son esenciales para el desarrollo de buena parte de la investigación en el IFT. Sus tareas también incluyen: manejo de los equipos informáticos de uso individual de pequeña escala, gestión de los recursos de uso general, como impresoras y redes, desarrollo y gestión de la página Web del IFT, y de su potente intranet que permite el acceso selectivo a servicios e información.

Computing and Information Technology

This service is responsible of the management of the information technology resources of the institute. One of its most fundamental and complex tasks is the management of the available high-performance computing (HPC) resources. These are essential for the development of a good fraction of the research taking place at the Institute. Other important tasks carried out by this service are: handling of the individual-use small scale computer equipment, management of general use resources, such as printers and networks, development and management of the IFT webpage, and of its powerful intranet allowing selective access to services and information.

Computación y TI
Computing and IT

Emilio Ambite (Head)
Felipe Álvarez
Antonio Cao (apoyo) (desde *since* 16/10/2022)
Jose Manuel Sánchez (apoyo) (hasta *until* 30/06/2021)

Servicio de Comunicación y Divulgación

El IFT tiene una amplia tradición en la transferencia de conocimiento a la sociedad. Organizamos muchas actividades de divulgación dirigidas al público en generall y al sector de enseñanza secundaria o de grado: cursos de formación, charlas públicas, participación en medios de comunicación, publicación de libros, etc. Un ejemplo la producción de vídeos para nuesto exitoso canal de Youtube. Además colaboramos con entidades de primer nivel como el Museo Thyssen-Bornemisza, la Residencia de Estudiantes, el Museo Nacional de Ciencia y Tecnología, así como los departamentos de Cultura Científica y Divulgación del CSIC, UAM y de la Comunidad de Madrid.

Communication and Outreach Service

The IFT has a very strong tradition in knowledge transfer of its research to broader audiences. We organize many outreach activities addressed to general public and also to High School students and teachers or undergraduate students. They include: training courses, public talks, participation in media, publication of books, etc. An illustrative example is the International Master class in Particle Physics, or the production of outreach videos for our extremely successful Youtube channel. We also have collaborations with top-class entities like the Thyssen-Bornemisza Museum, the CSIC Residencia de Estudiantes, the National Museum of Science and Technology, as well as with the Outreach Departments of CSIC, UAM and Community of Madrid.

Comunicación y Divulgación
Communication and Outreach

Susana Hernández (hasta *until* 28/02/2022)
Laura Marcos (desde *since* 16/04/2022)

Servicio de Administración

El objetivo de este servicio es el mantenimiento de la estructura administrativa del IFT de acuerdo con los más altos estándares de eficiencia, el uso óptimo de los recursos y la planificación racional. Este servicio es de vital importancia para que el instituto pueda lograr sus objetivos científicos, dada la intensa actividad desarrollada como la contratación de investigadores posdoctorales y predoctorales, la organización de seminarios, coloquios, talleres, programas de investigación o la gestión de visitas y viajes.

Administration Service

The goal of this service is to maintain the administrative structure of the institute according to the highest standards of efficiency, optimal use of resources and rational planning. This service is of crucial importance in order for the institute to achieve its scientific goals, given the intense activity developed, such as the hiring of postdoctoral and predoctoral researchers, the organization of seminars, colloquia, workshops, and research programs or the administration of visits and travels.

Administración *Administration*	
Secretaría de Dirección	Isabel Pérez
Visitantes y Congresos *Visitors and Workshops*	Mónica Vergel
Viajes y Recursos Humanos Travel, HHRR *Travel, HHRR*	Rebeca Alameda
Gestión proyectos "InvisiblesPlus" *"Invisibles Plus" Grant Managers*	Rebeca Bello
Apoyo *Support*	Mª Trinidad Romay (desde *since* 01/11/2022)

Servicios del CFTMAT

El CFTMAT proporciona servicios comunes a los dos institutos IFT e ICMAT situados en el edificio.

CFTMAT Services

The CFTMAT provides common services for the two institutes located in the building, the IFT and the ICMAT.

Servicios del CFTMAT *CFTMAT Services*	
Gerente *Manager*	Gabriel Catalán (desde *since* 11/12/2020)
Pagadora *Accountant*	María José Caballero
Apoyo *Support*	Iván Cosio (hasta *until* 31/01/2022) Marc Cornadó (desde *since* 01/12/2022) Ángeles Lumbreras (desde *since* 01/07/2021)
Director Biblioteca *Library Director*	Ricardo Martínez
Mantenimiento *Maintenance*	

Personal Investigador ○ Research Personnel

Personal Investigador / *Staff Members*

Apellido / *Family Name*	Nombre / *First Name*	Categoría / *Position*
Aguilar Saavedra	Juan Antonio	CT (since 11/11/2021)
Álvarez Vázquez	Enrique	CU
Bermúdez Carballo	Alejandro	IC (since 03/12/2021)
Casas González	Alberto	PI
de Rújula Alguer	Alvaro	Contract
Espinosa Sedano	José Ramón	PI
Fernández Barbón	J.Luis	IC
Fernandez Martinez	Enrique	PCD
García-Bellido Capdevila	Juan	CU
García Pérez	Margarita	CT
Gavela Legazpi	Belén	CU
Gómez López	César	PI
González-Arroyo España	Antonio	CU
Heinemeyer	Sven	PI
Herdoiza Bolaños	Gregorio	PCD
Herrero Solans	Maria Jose	CU
Ibáñez Santiago	Luis.E	CU
Landsteiner	Karl	IC
López Manzanares	Esperanza	IC
Maltoni	Michele	IC
Marchesano Buznego	Fernando Gabriel	IC
Merlo	Luca	RyC, PCD (since 12/11/2021)
Moreno Moreno	Jesús	CT
Muñoz López	Carlos	CU
Nesseris	Savvas	RyC, CT (since 11/11/2021)
Ortín Miguel	Tomás	PI
Pena Ruano	Carlos	PT
Poves Paredes	Alfredo	CU
Sabio Vera	Agustin	PCD
Sánchez Conde	Miguel Ángel	Atracción de Talento, PCD (since 01/06/2022)
Sierra Rodero	Germán	PI
Uranga Urteaga	Angel M.	PI

CU	Catedrático de Universidad / *University Professor (UAM)*
PT	Profesor Titular / *Associate Professor (UAM)*
PI	Profesor de Investigación / *Research Professor (UAM)*
IC	Investigador Científico / *Senior Researcher (CSIC)*
CT	Científico Titular / *Staff Researcher (CSIC)*
PCD	Profesor Contratado Doctor / *Contract Professor (UAM)*
BG	Investigador Beatriz Galindo / *Beatriz Galindo Fellow*
RyC	Investigador Ramón y Cajal / *Ramon y Cajal Fellow*

En excedencia / *Onleave*

Apellido / *Family Name*	Nombre / *First Name*	Obs./ *Obs.*
Paredes Ariza	Belén	CT

Investigadores Ramón y Cajal y Atracción de Talento CM / *Ramón y Cajal Researchers and CM Talent Attraction*

Apellido / *Family Name*	Nombre / *First Name*	Obs./ *Obs.*
Akrami	Yashar	Ramón y Cajal (since 01/09/2022)
Areán Fraga	Daniel	Atracción de Talento funds
Arganda Carreras	Ernesto	Atracción de Talento funds
Ballesteros Martinez	Guillermo	Atracción de Talento funds
Benincasa	Paolo	Atracción de Talento funds (until 01/06/2021)
Coloma Escribano	Pilar	Ramón y Cajal
Fasiello	Matteo	Atracción de Talento funds
Kuroyanagi	Sachiko	Atracción de Talento funds
No Redondo	Jose Miguel	Ramón y Cajal
Pedraza Avella	Juan Felipe	Atracción de Talento funds (since 01/02/2022)
Rodríguez	Maria Jose	Ramón y Cajal
Serra Mari	Javier	Ramón y Cajal (since 01/08/2022)
Valenzuela Agüi	Irene	Ramón y Cajal (since 01/09/2021)
Varela Rizo	Óscar	Ramón y Cajal

Profesores visitantes / *Long-term visiting professors*

Apellido / *Family Name*	Nombre / *First Name*	Obs./ *Obs.*
Grinstein	Benjamin	25/10/2021 - 07/12/2021
Collins	Rebecca	since 01/12/2022
Quirós Carcelen	Mariano	
Marcano Imaz	Xabier	01/09/2021 - 31/08/2022
Benincasa	Paolo	Atracción de Talento funds (until 01/06/2021)
Coloma Escribano	Pilar	Ramón y Cajal
Fasiello	Matteo	Atracción de Talento funds
Kuroyanagi	Sachiko	Atracción de Talento funds
No Redondo	Jose Miguel	Ramón y Cajal
Pedraza Avella	Juan Felipe	Atracción de Talento funds (since 01/02/2022)
Rodríguez	Maria Jose	Ramón y Cajal
Serra Mari	Javier	Ramón y Cajal (since 01/08/2022)
Valenzuela Agüi	Irene	Ramón y Cajal (since 01/09/2021)
Varela Rizo	Óscar	Ramón y Cajal

Investigadores postdoctorales / *Postdoctoral researchers*

Apellido / *Family Name*	Nombre / *First Name*	Financiación / *Funding*
Alestas	George	Atracción de Talento funds
Álvarez Urquiola	Mikel	Atracción de Talento funds, PGC2018, PID2021
Alves Batista	Rafael	La Caixa Junior Leader MSCA
Ávila Pérez	Santiago	Intertalentum UAM MSCA, PID2021, Seveo Ochoa
Blair	Christopher	Severo ochoa
Braglia	Matteo	Atracción de Talento funds
Cermeño Gavilán	Marina	Severo Ochoa
Céspedes Castillo	Sebastian	Severo Ochoa, Atracción de Talento funds
Coudarchet	Thibaut	Severo Ochoa, Ramon y Cajal funds, PGC2018
de los Ríos	Martín	Beatriz Galindo funds
Fleury	Pierre	La Caixa Junior Leader MSCA
Flory	Mario	PGC2018
Foldenauer	Patrick	Severo Ochoa
Fumagalli	Jacopo	Severo Ochoa, Atracción de Talento funds
Gaggero	Daniele	La Caixa Junior Leader MSCA
Gammaldi	Viviana	Juan de la Cierva
García Cerdeño	David	Beatriz Galindo funds
García García	Marcos	Severo Ochoa, PID2021
Grieninger	Sebastian	Atracción de Talento funds, Juan de la Cierva-formación
Hogg	Natalie Beth	La Caixa Junior Leader MSCA
Hyunsik	Jeong	Atracción de Talento funds
Jinno	Ryusuke	PID2019
Kpatcha	Essodjolo	PGC2018
Lacroix	Thomas	InterTalentum Postdoctoral Programme
López Asamar	Elías	María Zambrano funds
Marcano Imaz	Xabier	ERC
Martinelli	Matteo	La Caixa Junior Leader MSCA
Matulich	Javier	Severo Ochoa
Moliné	Ángeles	Atracción de Talento funds, Severo Ochoa
Morales	Roberto	Atracción de Talento funds
Ota	Toshihiko	Atracción de Talento funds, Severo Ochoa
Ozsoy	Ogan	Juan de la Cierva
Patra	Ayan Kumar	Severo Ochoa, Atracción de Talento funds
Pérez	Andrés Daniel	Beatriz Galindo funds
Pierre	Mathias	Severo Ochoa
Pinol	Lucas Toni	Atracción de Talento funds
Ramos	María	ITN Hidden funds
Sánchez Velázquez	Jose Manuel	Severo Ochoa
Sandá Seoane	Rosa María	Atracción de Talento funds
Singha Roy	Sudipto	QUITEMAD
Tastet	Jean-Loup	PGC2018, Juan de la Cierva

Investigadores predoctorales / *Predoctoral researchers*

Apellido / *Family Name*	Nombre / *First Name*
Aguirre Santaella	Alejandra
Alonso González	David
Alonso González	Javier
Angius	Roberta
Araneda Muñoz	Nicole
Arco García	Francisco
Arias Aragón	Fernando
Arjona Fernández	Rubén
Ballesteros Navarro	Romina
Bernal González	Alexander
Bethencourt de León	Nauzet
Bonilla García	Jesús
Boscá Navarro	Víctor David
Bris Cuerpo	Alejandro
Bultrini	Daniel
Buratti	Ginevra
Butti	Pietro
Caldarola	Marienza
Calderón Infante	Jose
Campos Yuste	Manuel
Cano Molina	Jose Manuel
Carrasco Carmona	Rafael
Castellano Mora	Alberto
Cesaro	Mattia
Conigli	Alessandro
Coronado Blázquez	Javier
Dasilva Golán	Jorge
De Giorgi	Arturo
Delgado	Matilda
Di Marco	Gaetano
Elgood	Zachary
Enguita Vileta	Víctor
Espinosa Portales	Llorenç
Fernández Casas	Gonzalo
Fernández Tejedor	Jaime
Fernández Suárez	Cristina
Fonseca Seabra	Joao
Fornieri	Ottavio
Fulgado Claudio	Carlos
Gambín Egea	Jesús
García Romeu	Pau
Gómez-Fayrén de las Heras	Carmen
González López	Manuel
Gutierrez Adame	Adrián
Gonzalo Badía	Eduardo
Hernández Rodríguez	Nelson
Huertas Castellanos	Jesús
Hunter Gordon	Max
Jaraba Gómez	Santiago
Larios Plaza	Gabriel
Lozano Onrubia	Álvaro
Machado Rodríguez	Jonathan Gilbert
Martín Ramiro	Pablo
Melotti	Luca
Mininno	Alessandro
Morales Tejera	Sergio
Morrás Gutiérrez	Gonzalo
Murcia Gil	Ángel
Naredo Tuero	Daniel
Nuño Siles	Jose Francisco
Ocampo Justiniano	Indira
Paoloni	Lorenzo
Pereñiguez Rodríguez	David
Pérez Panadero	Fernando
Pérez Rodríguez	Alejandro
Pérez Romero	Judit
Pico Lorenzo	Martín
Prieto Rodríguez	David
Quirant Pellín	Joan
Rey Idler	Julián
Reyes Peraza	Guillermo
Riquelme Chamblas	Walter
Rosauro Alcaraz	Salvador
Ruiz García	Ignacio
Sáez Gonzalvo	Alejandro
Samos de Buruaga	Nadir
Sánchez Ruiz	Irene
Santos García	Raquel
Sasieta Arana	Martín
Saura Bastida	Pablo
Scarcella	Francesc
Sopena González	Alejandro
Ugarrio Muñoz	Javier
Velasco Aja	Eduardo
Viñas Martínez	Pablo
Vos Ginés	Bernhard
Wiesner	Max
Zatti	Matteo
Zuriaga Puig	Jaume

PARTE III Infraestructura

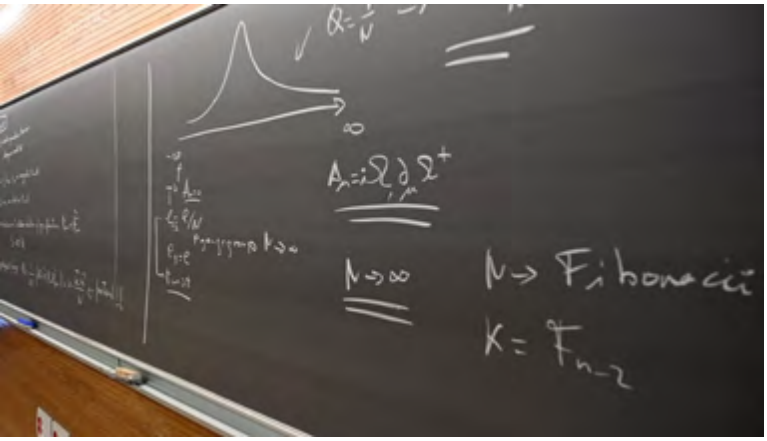
Infrastructure PART III

Edificio

Desde enero de 2011 el IFT ocupa un ala de un edificio de nueva construcción en el campus de la Universidad Autónoma de Madrid. El IFT, junto con el Instituto de Ciencias Matemáticas (ICMAT) que ocupa el otro ala, conforma el Centro de Física Teórica y Matemáticas CFTMAT. Ambos comparten las áreas comunes que acogen una biblioteca, cafetería, auditorio, aulas de seminarios y docencia, centro de procesamiento de datos, Recepción y Gerencia.

El edificio, de 6 plantas, cuenta con instalaciones totalmente modernas. Ofrece despachos individuales para todos los investigadores permanentes y Ramón y Cajal, oficinas de ocupación doble para investigadores pos-doctorales y despachos de ocupación cuádruple para estudiantes de doctorado. Asimismo hay despachos para visitantes y participantes en los congresos y programas del IFT . El equipo de computación científica y la biblioteca están en el sótano.

El edificio dispone de varias salas de conferencias con equipamiento audiovisual del más moderno nivel técnico. El IFT tiene su propia sala de seminarios con una capacidad de 80 plazas, denominada Sala Roja. Asimismo, y de forma compartida por el IFT y el ICMAT, cuenta con una sala de conferencias con una capacidad de 150 plazas, la Sala azul, y tres aulas más pequeñas con capacidad entre 20 y 30 plazas. La Sala Azulseutilizaparatalleresyconferenciasmásgrandes mientras las aulas más pequeñas se usan para las clases del programa de Master en Física Teórica, y para discusiones científicas. Por ultimo, un auditorio situado entre las dos alas de el edificio y un aforo de 250 plazas permite la celebración de congresos de elevado número de participantes.



Building

Since January 2011 the IFT occupies a wing a new building on the campus of Universidad Autónoma de Madrid. The IFT, together with the Institute of Mathematical Sciences (ICMAT) on the other wing, forms the Center for Theoretical Physics and Mathematics CFTMAT. Both share common areas including a large auditorium, seminar and teaching rooms, a library, cafeteria, computer centre, Reception and Management.

The 6-floor building features world class infrastructure. It offers single occupancy offices for all permanent and Ramón y Cajal researchers, double occupancy offices for postdoctoral researchers and quadruple occupancy offices for PhD students. There are also offices for visiting professors, and workshop participants. The High Performace Computing equipment and the library are located at the basement level. There are several lecture halls with state of the art audiovisual equipment.

IFT has its own seminar room with a capacity of 80 seats, known as the Red Room. A larger conference room with a capacity of 150 seats, the Blue Room, and three smaller lecture halls with capacities of 20-30 seats are jointly used by IFT and ICMAT. The Blue Room is used to host larger workshops and conferences whereas the smaller rooms are used for the lectures in the Master program in Theoretical Physics. Finally a large 250-seats lecture hall in the central area of the building can host large conferences.

Computación

El edificio IFT está equipado con un moderno Centro de Procesamiento de Datos (CPD) con capacidad para varios equipos de computación de alto rendimiento (HPC) unidades. El CPD tiene unos 70m², y su equipamiento cuenta con: suelo técnico elevado, máquinas de climatización y húmedad redundantes, un sistema de alimentación ininterrumpida que proporciona 75 KVAs de potencia, un grupo electrógeno y un sistema de extinción de incendios por gas.

Estas instalaciones de Computación Científica son esenciales para varias líneas de investigación en Física Teórica, por ejemplo cálculos de precisión en el Modelo Estándar o sus extensiones, predicciones de nueva Física en el LHC, simulación y estudio de estructuras a gran escala en el Universo, etc.

Algunos de los principales equipos del IFT son:

- El cluster Hydra, adquirido en 2009. Inicialmente se componía de 34 nodos Intel® Xeon® E5540 y se completó en 2011 y 2012 con dos blades con18 nodos (Intel® Xeon® E5645 and Intel® Xeon® E5-2640). Se volvió a ampliar en el 2020 con doce nodos con procesadores AMD Epyc 7552. El sistema incluye un sistema de almacenamiento LUSTRE que permite un servicio de datos en paralelo a los nodos, capaz de soportar flujos intensos de lectura/escritura. El sistema se completa con una red Infiniband. Hydra es en la actualidad la principal instalación de computación científica del IFT, con aproximadamente 90 usuarios registrados. Su contribución a los resultados de investigación del IFT se refleja en las varias docenas de publicaciones que presentan resultados obtenidos con Hydra, y que acumulan más de un millar de citas.
- El cluster Galilea, de los proyectos PAU y DES, que consiste en 4 Unidades de Procesamiento Gráfico Tesla C2070, con 448 cores de procesamiento CUDA cada una , y una memoria compartida con 160 cores Intel(R) Xeon(R) y 1 TB de RAM. El grupo de investigación de Lattice compró un servidor de almacenamiento para sus datos y dos nodos de GPUs con 2 Nvidia A100 cada uno. La financiación para la adquisición de estos equipamientos proviene de varios proyectos de investigación del IFT, el Plan Estratégico del CSIC, la Comunidad de Madrid y el proyecto Severo Ochoa.

Computing

The IFT building is equipped with a modern Data Processing Center (CPD) with capacity for several High-Performance Computing (HPC) units. The CPD occupies an area of about 70m² and its equipment includes: raised technical flooring, redundant air conditioning and humidity machines, an uninterruptible power supply providing 75 KVAs of power, a generator, and a gas fire extinguishing system.

These Scientific Computing facilities are essential for various lines of research in Theoretical Physics, such as precision calculations in the Standard Model or its extensions, predictions of new Physics at the LHC, simulation and study of large-scale structures in the Universe, etc.

Some of the main equipment at the IFT includes:

- The Hydra cluster, acquired in 2009. Initially composed of 34 Intel® Xeon® E5540 nodes, it was expanded in 2011 and 2012 with two blades containing 18 nodes each (Intel® Xeon® E5645 and Intel® Xeon® E5-2640). It was further expanded in 2020 with twelve nodes featuring AMD Epyc 7552 processors. The system includes a LUSTRE storage system that allows parallel data service to the nodes, capable of supporting intensive read/write streams. The system is completed with an Infiniband network. Hydra is currently the main scientific computing facility at the IFT, with approximately 90 registered users. Its contribution to the IFT's research results is reflected in several dozen publications presenting results obtained with Hydra, accumulating over a thousand citations.
- The Galilea cluster, from the PAU and DES projects, consisting of 4 Tesla C2070 Graphic Processing Units, with 448 CUDA processing cores each, and a shared memory with 160 Intel(R) Xeon(R) cores and 1 TB of RAM. The lattice research group purchased a storage server for their data and two GPU nodes with 2 Nvidia A100 each. Funding for the acquisition of this equipment comes from various research projects at the IFT, the CSIC Strategic Plan, the Community of Madrid, and the Severo Ochoa project.

In addition to these local resources, the IFT has participated in several requests for machine time at large-scale computing facilities, through the PRACE Consortium and the Spanish Supercomputing Network. As a result, IFT groups have participated in initiatives totaling more than 100 million CPU hours at major Computing centers in Europe (JUQUEEN, SuperMUC, and HLRN in Germany; Fermi and Galileo in Italy; MareNostrum, Altamira, and FinisTerrae in Spain; etc.)

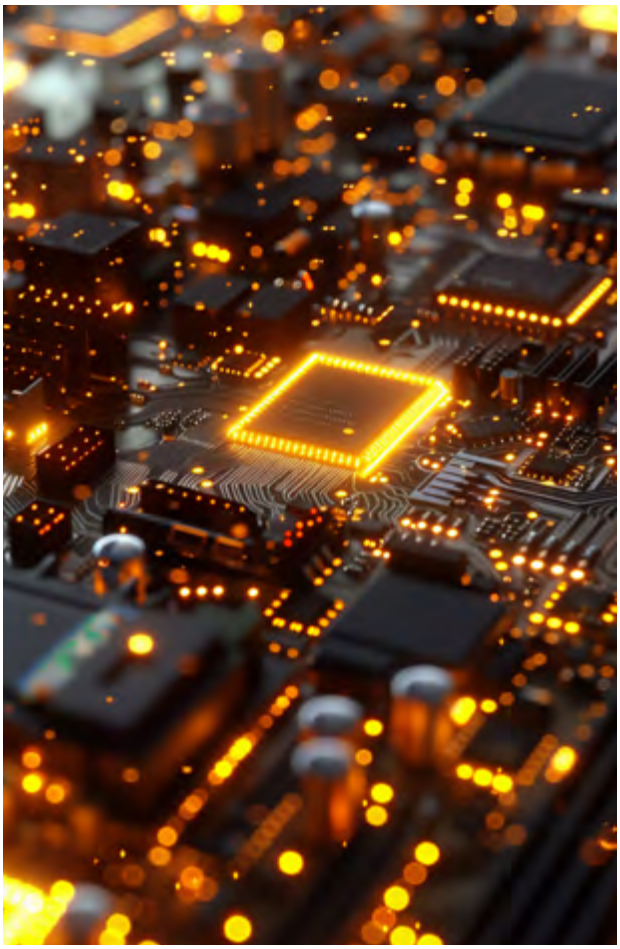
In addition to the powerful Scientific Computing equipment, the IFT has a rich information technology infrastructure that supports its research activity and automates various administrative processes: administrative procedures on the IFT's intranet, processing of predoctoral and postdoctoral position applications (approximately 400 postdoctoral applications per year), organization of seminars and workshops, the IFT's storage cloud, and the new IFT website and its services.

All the mentioned infrastructures are based on VPS servers hosted on two virtualization systems acquired with funds from the Severo Ochoa project. Details about HPC and management resources can be found on the website: http://www.ift.uam-csic.es/hydra/

Además de estos recursos locales, el IFT ha participado en varias solicitudes de tiempo de máquina en instalaciones de computación a gran escala, a través del Consorcio PRACE y de la Red Española de Supercomputación. Como resultado, los grupos del IFT han participado en iniciativas que suman más de 100 millones de horas de CPU en los principales centros de Computación en Europa (JUQUEEN, SuperMUC y HLRN en Alemania; Fermi y Galileo en Italia; MareNostrum, Altamira y FinisTerrae en España; etc.)

Además del potente equipamiento de Computación Científica, el IFT dispone de una rica infraestructura de tecnología de la información, que sostiene su actividad de investigación y automatiza diversos procesos administrativos: trámites administrativos en la intranet del IFT, tramitación de solicitudes de puestos predoctorales y postdoctorales (aproximadamente 400 solicitudes postdoctorales por año), organización de seminarios y workshops, la nube de almacenamiento del IFT, y la nueva Web del IFT y sus servicios.

Todas las infraestructuras mencionadas se basan en servidores VPS albergados en dos sistemas de virtualización adquiridos con fondos del proyecto Severo Ochoa. Los detalles sobre los recursos de HPC y de gestión se pueden encontrar en la página web: *http://www.ift.uam-csic.es/hydra/*



PARTE IV Memoria de Actividades

Report of Activities PART IV

Recursos Económicos ○ Economic Resources

Tipo	Referencia	Acrónimo	Título	Inv. Principal	Entidad Financiadora	Fecha Inicio	Fecha Fin	Financiacion Total	Observaciones	Entidad Gestora	Ámbito
Proy.	PID2020-118159GA-C42		El Universo gravitacional cuántico: fondo estocástico de ondas gravitacionales en relatividad general y más allá	Sachiko Kuroyanagi	Mineco	01/09/2021	31/08/2024	18.150,00 €		CSIC	Nacional
Proy. Individual	-			Rafael Alves Batista	La Caixa	01/09/2021	31/08/2024	38.500,00 €	305.100 € Dotación adicional de 38.500 € por anualidad, el resto es su salario	UAM	Privado
Proy. Individual	JC2019-040315-I			Viviana Gamaldi	Ministerio de Ciencia e Innovación	01/03/2021	28/02/2024	6.000,00 €	93.000 Dotación adicional de 6.000 € en total, el resto es su salario	UAM	Nacional
Proy.	101020274	BeSST-VACUA	Más allá de los vacíos supersimétricos en teoría de cuerdas	Ángel Uranga	CSIC	01/10/2021	30/09/2023	100.000,00 €		CSIC	Internacional
Proy. Individual	RYC2019-028512-I		Ramón y Cajal	Irene Valenzuela	Ministerio de Ciencia e Innovación	01/09/2021	31/08/2026	208.600,00 €	Dotación adicional de 40.000 € en total, el resto es su salario	UAM	Nacional
Proy. Individual			La Caixa InPhinit	Matteo Zatti	La Caixa	15/02/2021	14/02/2021	122.592,00 €	Dotación adicional de 10.692 €, resto es su salario	UAM	Nacional
Proy. Individual			La Caixa InPhinit	Luca Melotti	La Caixa	15/11/2021	14/11/2024	122.592,00 €	Dotación adicional de 10.692 €, resto es su salario	UAM	Nacional
Proy. Individual	2021-5A/TIC-20966		Atracción de Talento	Areán, Daniel	CAM	01/04/2022	31/03/2023	30.000,00 €	"5º año del Talento (FINANCIACIÓN ADICIONAL 30.000,00 € CONTRATACIÓN 55.000,00 €)"	UAM	regional
Proy. Individual	2021-5A/TIC-20957		Atracción de Talento	Ballesteros, Guillermo	CAM	27/05/2022	26/05/2023	30.000,00 €	5º año del Talento	UAM	regional
	CEX2020-001007-S		Severo Ochoa	Uranga, Angel	Mcin	01/01/2022	31/12/2025	4.000.000,00 €		CSIC	Nacional
ERC Starting Grant		Qguide	Qguide: The Quantum Gravity Imprint: New Guiding Principles At Low Energies	Valenzuela, Irene	UE	01/10/2022	30/09/2027	1.382.625,00 €	"CERN: coste total 780.750 € UAM: coste total 601.875"	UAM	Europeo
Proy. i-Link	LINKA20416		Application of Machine Learning to new cosmological observations	Sachiko Kuroyanagi		01/01/2022	31/12/2023	23.982,05 €		CSIC	
Proy. Individual	2020-T1/TIC-20495		Atracción de Talento	Juan Pedraza	CAM	01/02/2022	31/01/2026	337.455,72 €		CSIC	regional
Proy.	PID2021-123017NB-100		Aspectos clave de la teoria de cuerdas: La cienaga, agujeros negros y holografia.	"Fernando Marchesano Jose Luis Fernandez"	Ministerio de Ciencia e Innovación	01/09/2022	31/08/2025	441.650,00 €		CSIC	Nacional
Proy.	PID2021-125700NB-C21		Gravedad, supergravedad y supercuerdas	Tomás Ortín	Ministerio de Ciencia e Innovación	01/09/2022	31/08/2025	142.780,00 €		CSIC	Nacional

Tipo	Referencia	Acrónimo	Título	Inv. Principal	Entidad Financiadora	Fecha Inicio	Fecha Fin	Financiacion Total	Observaciones	Entidad Gestora	Ámbito
Proy.	PID2021-127726NB-I00		Many-body quantum technologies	"Germán Sierra Esperanza Lopez"	Ministerio de Ciencia e Innovación	01/09/2022	31/08/2025	151.250,00 €		CSIC	Nacional
Proy.	PID2021-123012NB-C43		Fisica fundamental y cosmologia con cartografiados extragalacticos	"Juan Garcia-Bellido Savvas Nesseris"	Ministerio de Ciencia e Innovación	01/09/2022	31/08/2025	204.490,00 €		UAM	Nacional
Proy.	PID2021-124704NB-100		Física más allá del modelo estandar y cosmologia del universo primitivo:nuevas ideas y tecnicas	"Gillermo Ballesteros Jose Miguel de no"	Ministerio de Ciencia e Innovación	01/09/2022	31/08/2025	89.540,00 €		UAM	Nacional
Proy.	PID2021-127526NB-100		Fisica de particulas no perturbativa a la vanguardia de los metodos computacionales	"Gregorio Herdoiza Carlos Pena "	Ministerio de Ciencia e Innovación	01/09/2022	31/08/2025	239.580,00 €		UAM	Nacional
Proy. Individual	RYC2020-030193-I		Ramón y Cajal	Yashar Akrami	Ministerio de Ciencia e Innovación	01/09/2022	31/08/2027	324.250,00 €	Dotación adicional de 42.000 € en total, el resto es su salario	CSIC	Nacional
Proy. Individual	RYC2020-028992-I		Ramón y Cajal	Javier Serra	Ministerio de Ciencia e Innovación	01/08/2022	31/07/2027	324.250,00 €	Dotación adicional de 42.000 € en total, el resto es su salario	CSIC	Nacional
Proy. Individual	IJC2020-045803-I		Juan de la Cierva - Incorporación	Ogan Ozsoy	Ministerio de Ciencia e Innovación	01/11/2022	31/10/2025	97.800,00 €	"30.500 € ayuda salario 6.300 € gastos invest."	CSIC	Nacional
Marie Curie	Project 101066105		Phenomenological implications of neutrino effctive theories	Xabier Marcano	Comision Europea	01/09/2022	31/08/2024	165.312,96 €		UAM	
Proy. Individual	CA3/RSUE/2021-00827		Maria Zambrano	Elías López	Ministerio de Univ. / UAM	01/01/2022	31/12/2024	147.500,00 €	Ayuda desplazamiento 3.500 € en total, el resto es su salario	UAM	Nacional
Proy. Individual	20223AT023		Intramural CSIC a RyC	Javier Serra	CSIC	01/08/2022	31/07/2025	149.800,00 €	El CSIC aporta 112.350 € y el IFT 37.450 €	CSIC	Nacional
Proy. Individual	20225AT025		Intramural CSIC a RyC	Yashar Akrami	CSIC	01/11/2022	31/10/2025	150.000,00 €	El CSIC aporta 135.000 € y el IFT 15.000 €	CSIC	Nacional
Proy. Individual	2022501016		Intramural CSIC incorporación CT	Juan Antonio A. Saavedra	CSIC	07/11/2022	31/12/2023	5.000,00 €		CSIC	Nacional
Proy. Individual			La Caixa InPhinit	Indira Ocampo	La Caixa	16/10/2022	15/10/2025	122.592,00 €	Dotación adicional de 10.692 €, resto es su salario	UAM	privado
Proy. Individual			La Caixa InPhinit	Lorenzo Paoloni	La Caixa	01/11/2022	31/10/2025	122.592,00 €	Dotación adicional de 10.692 €, resto es su salario	UAM	privado
Proy. Individual	202250I152		Intramural CSIC incorporación CT	Savvas Nesseris	CSIC	03/11/2022	31/12/2023	5.000,00 €		CSIC	Nacional
Proy.	PID2021-125331NB-I00		"PARTICULAS, ASTROPARTICULAS Y MATERIA OSCURA EN EL UNIVERSO"	"Sanchez Conde y Garcia Cerdeño"	Ministerio de Ciencia e Innovación	01/09/2022	31/08/2025	176.660,00 €		UAM	Nacional

Publicaciones ○ Publications

2021 — [1–318] 2022 —[319–637]

Publications in Journals

[1] **ATLAS** Collaboration, M. Aaboud et al., *Measurement of the relative $B_c^{\pm}/B^{\pm}$ production cross section with the ATLAS detector at $\sqrt{s} = 8$ TeV*, *Phys. Rev. D* **104** (2021), no. 012010. doi:10.1103/physrevd.104.012010.

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Congresos y talleres
Conferences and Workshops

25/01/2021-27/01/2021

17th MultiDark Consolider Workshop

Hasta ahora, la ciencia no ha logrado identificar qué constituye hasta el 85% de la materia del Universo. Elucidar la naturaleza de la materia oscura constituye un desafío clave en la física moderna. MultiDark es una Red Consolider apoyada por la Agencia Española de Investigación, en la que grupos teóricos y experimentales con físicos de partículas, astrofísicos y cosmólogos de 18 universidades e institutos de investigación españoles, expertos en física de astropartículas, unen esfuerzos para abordar esta tarea desde una perspectiva multidisciplinaria.

Up to now science has failed to identify what makes up to 85% of the matter of the Universe. Elucidating the nature of dark matter constitutes a key challenge in modern physics. MultiDark is a Consolider Network supported by the Spanish Research Agency, in which theoretical and experimental groups with particle physicists, astrophysicists and cosmologists from 18 Spanish universities and research institutes, experts in astroparticle physics, join efforts to take up this task from a multidisciplinary perspective.

https://www.ift.uam-csic.es/en/events/17th-multidark-consolider-workshop

31/05/2021-04/06/2021

Invisibles workshop

El taller virtual Invisibles21 tuvo lugar del 31 de mayo al 4 de junio de 2021, tras la Escuela Invisibles21. Este encuentro anual de la red ITN Marie Curie Horizon 2020 HIDDeN continuó la serie de eventos "Invisibles" que comenzó en 2012, incluyendo las redes ITN Marie Curie Horizon 2020 Invisibles y Elusives, y la red RISE Horizon 2020 InvisiblesPlus.

El taller se centró en "Neutrinos, Materia Oscura, Axiones y otros Elusivos". Las discusiones abarcaron diversos temas, como partículas invisibles como neutrinos, axiones y WIMPs; búsquedas más allá del Modelo Estándar en colisionadores; y partículas invisibles en astrofísica y cosmología, incluyendo búsquedas de materia oscura, agujeros negros, ondas gravitacionales y el origen de los rayos cósmicos.

The Invisibles21 virtual Workshop took place from May 31 to June 4, 2021, following the Invisibles21 School. This annual meeting of the Horizon 2020 Marie Curie ITN network HIDDeN continued the series of "Invisibles" events that began in 2012, including the Horizon 2020 Marie Curie ITN networks Invisibles and Elusives, and the Horizon 2020 RISE network InvisiblesPlus.

The workshop focused on "Neutrinos, Dark Matter, Axions, and other Elusives." Discussions covered various topics, such as invisible particles like neutrinos, axions, and WIMPs; Beyond Standard Model searches at colliders; and invisibles in astrophysics and cosmology, including dark matter searches, black holes, gravitational waves, and the origin of cosmic rays.

https://www.ift.uam-csic.es/en/events/invisibles-workshop

18/10/2021-20/10/2021

18th MultiDark Consolider Workshop

MultiDark es un proyecto que reunió a científicos de varias instituciones españolas para investigar la materia oscura, responsable del 85% de la materia del Universo. En este congreso se presentaron avances en la detección directa de partículas, incluyendo teorías de campo efectivo, estudios de radiopureza y el uso de inteligencia artificial. También se exploraron búsquedas en el LHC con modelos de partículas exóticas y análisis del momento magnético del muón. En la detección indirecta, se discutieron observaciones de rayos gamma, rayos cósmicos y la posible relación con agujeros negros. El congreso finalizó con charlas sobre cosmología y simulaciones del Universo.

MultiDark is a project that brought together scientists from various Spanish institutions to investigate dark matter, responsible for 85% of the Universe's matter. This congress presented advances in the direct detection of particles, including effective field theories, radiopurity studies, and the use of artificial intelligence. Searches at the LHC were also explored, focusing on models of exotic particles and analyses of the muon's magnetic moment. Indirect detection discussions covered observations of gamma rays, cosmic rays, and potential links to black holes. The congress concluded with talks on cosmology and Universe simulations.

https://www.ift.uam-csic.es/en/events/18th-multidark-consolider-workshop

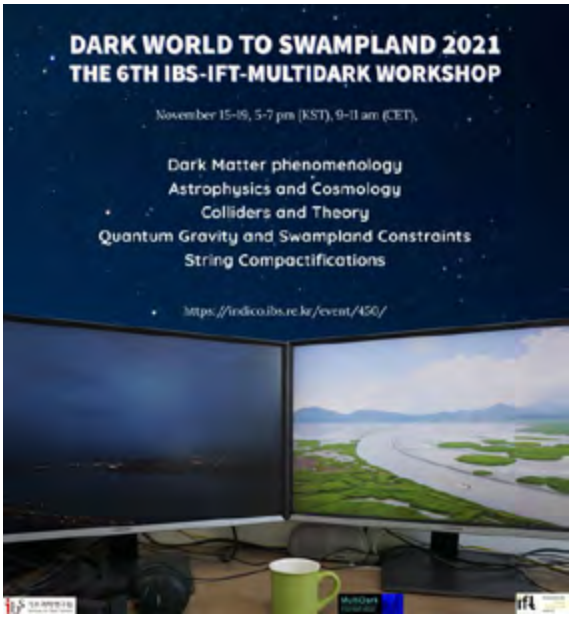
2021

15/11/2021-19/11/2021

Dark World to Swampland 2021,
The 6th IBS-IFT-MultiDark Workshop

El taller IBS-IFT-MultiDark, celebrado en línea a través de Zoom del 15 al 19 de noviembre de 2021, fue organizado por el IFT, MultiDark y el IBS-CTPU. El taller tuvo como objetivo intercambiar ideas, promover colaboraciones y discutir desarrollos recientes en física teórica de altas energías.

Los temas clave incluyeron fenomenología de cuerdas, materia oscura, física de partículas, astrofísica, cosmología, colisionadores y teoría, gravedad cuántica y compactificaciones de cuerdas.



The IBS-IFT-MultiDark Workshop, held online via Zoom from November 15 to November 19, 2021, was organized by IFT, MultiDark, and IBS-CTPU. The workshop aimed to exchange ideas, promote collaborations, and discuss recent developments in theoretical high energy physics.

Key topics included string phenomenology, dark matter, particle physics, astrophysics, cosmology, colliders and theory, quantum gravity, and string compactifications.

https://www.ift.uam-csic.es/en/events/dark-world-swampland-2021-6th-ibs-ift-multidark-workshop

15/12/2021-17/12/2021

'XXVII IFT Xmas Workshop'

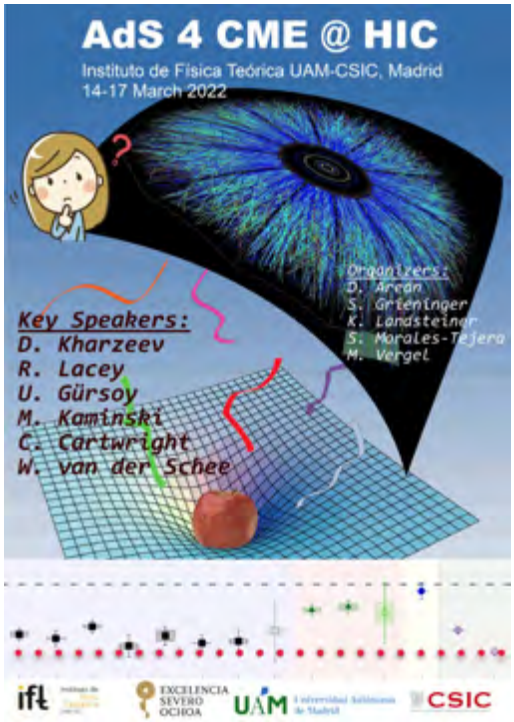
Del 15 al 17 de diciembre de 2021 se celebró la XXVII edición del congreso anual de Navidad en el Instituto de Física Teórica (IFT UAM-CSIC). Expertos discutieron desarrollos recientes en física de partículas, astropartículas, cosmología, teoría de cuerdas e información cuántica. Umut Gürsoy impartió su charla sobre hidrodinámica de quarks, Maciej Lewenstein sobre átomos fríos y teorías de gauge en redes y Miguel Montero sobre consecuencias IR de la gravedad cuántica. Géraldine Servant habló sobre ondas gravitacionales primordiales impulsadas por axiones, Joachim Kopp cubrió anomalías de neutrinos de línea base corta, y Rafael Porto abordó la gravedad de precisión desde el LHC hasta LISA y ET. Gabrijela Zaharijas presentó sobre la búsqueda de materia oscura con rayos gamma y Zoltan Fodor discutió la anomalía muónica de QCD.

From December 15 to 17, 2021, the XXVII annual Christmas Workshop at IFT UAM-CSIC featured talks by Umut Gürsoy on quark hydrodynamics, Maciej Lewenstein on cold atoms and lattice gauge theories, Miguel Montero on quantum gravity's IR consequences. Géraldine Servant discussed axion-boosted primordial gravitational waves, Joachim Kopp covered short-baseline neutrino anomalies, and Rafael Porto addressed precision gravity from the LHC to LISA and ET. Gabrijela Zaharijas presented on gamma ray dark matter searches, and Zoltan Fodor discussed the muon anomaly from QCD.

https://www.ift.uam-csic.es/en/events/xxvii-ift-xmas-workshop

14/03/2022-17/03/2022

'AdS4CME@HIC Workshop'



Las anomalías quirales pueden conducir a nuevos fenómenos de transporte, como los efectos magnético quiral y vortical quiral. La colaboración STAR analizó datos de la ejecución de isótopos del RHIC para buscar la separación de carga inducida por el CME. Sin embargo, los resultados resultaron ser ambiguos, destacando la necesidad de una mejor comprensión teórica. La holografía ha contribuido a la teoría del transporte quiral desde el principio. Los participantes de este congreso discutieron cómo la holografía puede contribuir a profundizar aún más la comprensión teórica, con especial énfasis en cómo abordar las preguntas que surgen de la ejecución de isótopos del RHIC.

Chiral anomalies can lead to new transport phenomena such as the chiral magnetic and the chiral vortical effects. Recently the STAR collaboration has analyzed data from the RHIC isobar run to search for charge separation induced by the CME. The results hower turned out to be ambigous highlightening the need for better theoretical understanding. Holography has contributed to the theory of chiral transport from the very beginning. The participants of this workshop discuss how holography can contribute to further deepening the theoretical understanding with particular emphasis on how to address the questions arising fromt he RHIC isobar run.

https://www.ift.uam-csic.es/en/events/ads4cmehic

09/05/2022-11/05/2022

'6th Red LHC Workshop'

Este es un congreso dedicado a promover la interacción y discusión entre teóricos y experimentalistas, abarcando temas como el Higgs, el quark top, EFT, LLP y las perspectivas para la ejecución 3 del LHC y el HL-LHC.

This is a workshop devoted to promoting the interaction and discussion between theorists and experimentalists, covering topics such as Higgs, top, EFT, LLP, and prospects for LHC Run 3 and HL-LHC.

https://www.ift.uam-csic.es/en/events/6th-red-lhc-workshop

12/05/2022-13/05/2022

Prime Matters Workshop

Desde la hipótesis de Riemann hasta el entrelazamiento, desde los superconductores hasta la supersimetría, Germán Sierra ha inspirado a una generación de investigadores con su estilo particular de hacer Física y Matemáticas, que fomenta la profundidad y la perspicacia. Este congreso se celebró con motivo de su 67º cumpleaños (que es un número primo de la suerte).

From the Riemann hypothesis to entanglement, from superconductors to supersymmetry, Germán Sierra inspired a generation of researchers with his particular style of doing Physics and Mathematics, which encouraged depth and insight. This congress was held on the occasion of his 67th birthday (which is a lucky prime).

https://www.ift.uam-csic.es/en/events/prime-matters

16/05/2022-17/06/2022

'NuTs (Neutrinos Theories) Extended Workshop'

El Taller Extendido NuTs (Teorías de Neutrinos) 2022 se llevó a cabo en el Instituto de Física Teórica (IFT) en Madrid del 16 de mayo al 17 de junio de 2022. Este taller de cinco semanas tuvo como objetivo fomentar la colaboración, con participantes permaneciendo durante dos o tres semanas. Cada semana se centró en un tema específico, con una o dos presentaciones diarias.

The Extended Workshop NuTs (Neutrino Theories) 2022 was hosted by the Institute for Theoretical Physics (IFT) in Madrid from May 16 to June 17, 2022. This five-week workshop aimed to foster collaboration, with participants staying for two to three weeks. Each week focused on a specific topic, featuring one or two presentations per day.

https://www.ift.uam-csic.es/en/events/nuts-neutrinos-theories-extended-workshop

23/05/2022-25/05/2022

19º edición de 'MultiDark' Workshop

El principal objetivo de MultiDark es impulsar la posición española en el campo creando sinergias y colaboraciones entre los grupos participantes, con el fin de contribuir significativamente a los esfuerzos mundiales para identificar y detectar la materia oscura. Para lograrlo, se estudian las partículas candidatas más plausibles como materia oscura, se investiga cómo estas candidatas se distribuyen en el Universo, se apoya el desarrollo de experimentos dirigidos a su detección y se analiza la combinación de datos del LHC con las búsquedas directas e indirectas actuales.

The main objective of MultiDark is to enhance Spain's position in the field by creating synergies and collaborations among participating groups, aiming to significantly contribute to global efforts in identifying and detecting dark matter. To achieve this goal, MultiDark studies the most plausible candidate particles for dark matter, investigates how these candidates are distributed in the Universe, supports the development of experiments aimed at their detection, and analyzes the combination of LHC data with current direct and indirect searches.

https://www.ift.uam-csic.es/en/events/19%C2%BA-edici%C3%B3n-de-%E2%80%98multidark%E2%80%99

23/05/2022-27/05/2022

Geometric Aspects of the Swampland - Part I Workshop

Este congreso se centró en los aspectos geométricos del Programa Swampland o Ciénaga, con un énfasis especial en la interrelación entre las propiedades generales de la gravedad cuántica y la geometría algebraica. El objetivo fue reunir a físicos teóricos y geométricos para explorar las numerosas conexiones entre campos que han surgido recientemente en el estudio de las Conjeturas de la Ciénaga. Esta actividad fue una iniciativa conjunta del Instituto de Ciencias Matemáticas (ICMAT) y el Instituto de Física Teórica (IFT) en Madrid, y se llevó a cabo de manera presencial en el CFTMAT.

This workshop focused on the geometric aspects of the Swampland Program, with a special emphasis on the interrelation between general properties of quantum gravity and algebraic geometry. The workshop aimed to bring together theoretical physicists and geometers to explore the many connections between fields that have recently emerged in the study of the Swampland Conjectures. This activity was a joint initiative of the Institute of Mathematical Sciences (ICMAT) and the Institute of Theoretical Physics (IFT) in Madrid, and took place onsite at CFTMAT.

https://www.ift.uam-csic.es/en/events/geometric-aspects-swampland-part-i

08/06/2022-10/06/2022

Geometric Aspects of the Swampland - Part II Workshop

Timo Weigand
(Instituto de Física Teórica
de la Universidad de Hamburgo)
Imagen: ICMAT

Irene Valenzuela
(CERN y Universidad Autónoma de Madrid)
Imagen: ICMAT

El éxito del congreso sobre los aspectos geométricos del Programa del Pantano llevó a la organización de una segunda parte enfocada en aplicaciones concretas de la geometría algebraica en la física teórica. Esta continuación del evento exploró cómo las herramientas y métodos geométricos pueden iluminar aspectos fundamentales de la teoría de cuerdas y la gravedad cuántica, profundizando en la comprensión de las Conjeturas de la Ciénaga.

El Instituto de Ciencias Matemáticas (ICMAT) y el Instituto de Física Teórica (IFT) en Madrid colaboraron nuevamente para facilitar un entorno propicio para la colaboración entre físicos teóricos y geométricos.

https://www.ift.uam-csic.es/en/events/geometric-aspects-swampland-part-ii

14/06/2022-16/06/2022

AI goes MAD Workshop

El taller AI goes MAD se llevó a cabo en el Instituto de Física Teórica (IFT-UAM/CSIC) del 14 al 16 de junio de 2022. El objetivo fue reunir a prestigiosos físicos con experiencia en física de partículas, gravedad, teoría de cuerdas, cosmología y astrofísica, así como en computación cuántica e información, interesados en las interacciones entre la física y la inteligencia artificial. Hoy en día, el aprendizaje automático y la inteligencia artificial son herramientas esenciales para analizar datos cada vez más complejos, y ya se utilizan ampliamente en la física. Además, se están explorando ideas en la dirección opuesta, es decir, el uso de conceptos matemáticos y técnicas de la física teórica para comprender más profundamente el aprendizaje automático y la inteligencia artificial. Los miembros del IFT, que han estado avanzando propuestas innovadoras en muchos de estos campos, tuvieron la oportunidad de intercambiar ideas con expertos mundiales en aprendizaje automático e inteligencia artificial.

The AI goes MAD workshop was held at the Institute of Theoretical Physics (IFT-UAM/CSIC) from June 14 to 16, 2022. The goal was to gather prestigious physicists with expertise in particle physics, gravity, string theory, cosmology, and astrophysics, as well as in quantum computing and information, who are interested in the interactions between physics and artificial intelligence. Today, machine learning and artificial intelligence are essential tools for analyzing increasingly complex data, and they are already widely used in physics. In addition, ideas in the opposite direction are also being explored, namely the use of mathematical concepts and techniques from theoretical physics to understand machine learning and artificial intelligence more deeply. IFT's members, who have been advancing innovative proposals in many of these fields, had the opportunity to exchange ideas with world experts in machine learning and artificial intelligence.

https://www.ift.uam-csic.es/en/events/ai-goes-mad

04/07/2022

Twist in the Tale Workshop

El 4 de julio de 2022, el Instituto de Física Teórica (IFT) honró a uno de sus investigadores más queridos, Tony González-Arroyo, en ocasión de su 70 cumpleaños. Algunas de las contribuciones más destacadas de su carrera giraron en torno a un concepto conocido como "twisted boundary conditions", frecuentemente abreviado como twist.

https://www.ift.uam-csic.es/en/events/twist-tale

On July 4, 2022, the Institute of Theoretical Physics (IFT) honored one of its most beloved researchers, Tony González-Arroyo, on the occasion of his 70th birthday. Some of the most significant contributions of his career revolved around a concept known as "twisted boundary conditions," often abbreviated as twist.

14/09/2022-16/09/2022

CRPropa Workshop on Astroparticle Propagation Workshop

El Congreso CRPropa sobre la propagación de astropartículas marcó un hito importante en la astrofísica de alta y ultra alta energía. En la última década, los avances en la recopilación de datos de observatorios de rayos cósmicos, rayos gamma y neutrinos han transformado nuestra comprensión de estos fenómenos. El congreso tuvo como objetivo integrar estas observaciones en un marco unificado para abordar preguntas abiertas en esta era multimensajera.

Los participantes exploraron temas desde la propagación de rayos cósmicos, electrones, rayos gamma y neutrinos en un amplio espectro de energías, desde GeV hasta ZeV. Se discutieron desarrollos computacionales recientes dentro de CRPropa y avances más generales en la teoría del transporte de astropartículas en entornos astrofísicos y distancias cosmológicas. Además, hubo sesiones dedicadas que destacaron las sinergias con las investigaciones de física más allá del Modelo Estándar. El congreso facilitó discusiones fructíferas y colaboraciones entre los participantes, algunos de los cuales extendieron su estancia para seguir trabajando en colaboración después del evento.

The CRPropa Congress on astroparticle propagation was recently held, marking a significant milestone in high- and ultra-high-energy astrophysics. Over the past decade, advances in data collection from cosmic-ray, gamma-ray, and neutrino observatories have transformed our understanding of these phenomena. The congress aimed to integrate these observations into a unified framework to address open questions in this multimessenger era.

Participants explored topics ranging from the propagation of cosmic rays, electrons, gamma rays, and neutrinos across a broad spectrum of energies, from GeV to ZeV. Discussions focused on recent computational developments within CRPropa and broader advancements in astroparticle transport theory in astrophysical environments and cosmological distances. Additionally, dedicated sessions highlighted synergies with research into physics beyond the Standard Model. The congress provided fruitful discussions and collaborations among participants, some of whom extended their stay to continue collaborative work after the event.

https://www.ift.uam-csic.es/en/events/crpropa-workshop-astroparticle-propagation

19/09/2022-23/09/2022

A cosmic window to Fundamental Physics: Primordial Non-Gaussianity and beyond Workshop

El congreso exploró cómo las escalas más grandes del Universo son clave para estudiar la física fundamental, como el origen de la estructura cósmica y la relatividad general. Aunque la inflación cósmica explica bien las estructuras a gran escala, existe una amplia diversidad de modelos inflacionarios. La no gaussianidad primordial (PNG), especialmente parametrizada por fNL, es crucial para restringir estos modelos. Las restricciones actuales del bispectro del CMB por Planck son estrictas, pero futuros avances, como los experimentos de etapa IV como Euclid y SKA, apuntan a alcanzar σ(fNL)<1 para PNG local. Las sinergias entre encuestas cosmológicas prometen mediciones sin precedentes de grandes escalas, abordando la varianza cósmica y mejorando las restricciones de PNG. Los desafíos incluyen modelar efectos de luz cone y sesgos sistemáticos observacionales. Experimentos futuros del CMB y interferómetros de ondas gravitacionales como LIGO-Virgo-Kagra y LISA también están preparados para contribuir significativamente a las mediciones de PNG en diferentes escalas y frecuencias, potencialmente diferenciando entre modelos inflacionarios.

The workshop discussed the role of ultralarge scales in probing fundamental physics, such as cosmic structure origins and general relativity. While cosmic inflation is widely accepted for explaining large-scale structures, the diversity of inflationary models remains vast. Primordial non-Gaussianity (PNG), particularly parameterized by fNL, serves as a critical observable to constrain these models further. Current constraints from the CMB bispectrum by Planck are tight, but future advancements, especially with Stage IV surveys like Euclid and SKA, aim to achieve σ(fNL)<1 for local PNG. Synergies between cosmological surveys promise unprecedented measurements of large scales, addressing cosmic variance and improving PNG constraints. Challenges include modeling light cone effects and observational systematic biases. Future CMB experiments and gravitational wave interferometers like LIGO-Virgo-Kagra and LISA are also poised to contribute significantly to PNG measurements across different scales and frequencies, potentially discerning between inflationary models.

https://www.ift.uam-csic.es/en/events/cosmic-window-fundamental-physics-primordial-non-gaussianity-and-beyond

26/09/2022-28/09/2022

Back to the Swamp Workshop

El congreso se centró en el programa del Swampland, que establece restricciones sobre teorías efectivas compatibles con la gravedad cuántica, configurando un Paisaje de teorías viables. Este programa es crucial para abordar preguntas clave en física de partículas y cosmología, incluyendo la jerarquía de escalas fundamentales y el origen y destino final del universo. Expertos destacados se reunieron para discutir los avances recientes en la comprensión del Swampland y sus implicaciones para ambos campos. Este congreso marcó la tercera edición tras los exitosos congresos "Vistas sobre el Swampland" y "Navegando por el Swampland".

https://www.ift.uam-csic.es/en/events/back-swamp

The workshop focused on the Swampland program, which establishes constraints on effective theories consistent with quantum gravity, shaping a Landscape of viable theories. This program is pivotal in addressing key questions in particle physics and cosmology, including the hierarchy of fundamental scales and the universe's origin and fate. Leading experts convened to discuss recent advancements in understanding the Swampland and its implications for both fields. This workshop marked the third edition following the successful workshops "Vistas over the Swampland" and "Navigating the Swampland."

14/11/2022-18/11/2022

13th International workshop on Multiple Partonic Interactions at the LHC Workshop'

Multiple Partonic Interactions at the LHC 2022 fue la decimotercera conferencia de una serie de exitosos talleres conjuntos de teoría/experimento que reunieron a los principales expertos mundiales en teoría y experimentos del LHC para discutir los últimos avances en física relacionada con las Interacciones Múltiples Partónicas. La conferencia de este año se llevó a cabo en modo híbrido en Madrid, organizada por el IFT, UAM/CSIC. La conferencia abordó los siguientes temas, divididos en grupos de trabajo: Evento Mínimo, Evento Subyacente y generadores Monte Carlo; Colisiones de Doble Partón; Altas multiplicidades y sistemas pequeños; Difracción y pequeños valores de x; y Colisiones de Iones Pesados.

Multiple Partonic Interactions at the LHC 2022 was the thirteenth conference in a series of successful joint theory/experiment workshops that brought together the world's leading experts from theory and LHC experiments to discuss the latest progress on physics related to Multiple Partonic Interactions. This year's conference was held in a hybrid mode in Madrid, hosted by the IFT, UAM/CSIC. The conference covered the following topics, divided into working groups: Minimum Bias, Underlying Event and Monte Carlo generators; Double Parton Scattering; High multiplicities and small systems; Diffraction and small-x; and Heavy Ion collisions.

https://www.ift.uam-csic.es/en/events/13th-international-workshop-multiple-partonic-interactions-lhc

14/12/2022-16/12/2022

XXVIII IFT Xmas Workshop

Del 14 al 16 de diciembre de 2022, se celebró la XXVIII edición del Taller de Navidad anual en el Instituto de Física Teórica (IFT) UAM-CSIC. Durante el evento, destacados expertos se reunieron para discutir los últimos avances en física de partículas (astro), fenomenología, cosmología, teoría de cuerdas e información cuántica. Los temas abordados incluyeron la evaluación del Modelo Estándar, búsquedas más allá del Modelo Estándar en experimentos de la frontera de intensidad, neutrinos astrofísicos de alta energía, la conexión entre física del LHC y cosmología a través del bosón de Higgs, modelos generativos cuánticos en física de altas energías, quarks pesados y teorías efectivas en QCD de red, resultados y perspectivas futuras de LIGO-Virgo-KAGRA, y estrellas de neutrones como laboratorios para axiones. También se exploraron simetrías emergentes de formas superiores en fases de la materia y agujeros de gusano en gravedad cuántica, seguidos de una recepción de Navidad del IFT.

From December 14th to December 16th, 2022, the XXVIII edition of the annual Christmas Workshop was held at the Instituto de Física Teórica (IFT) UAM-CSIC. Leading experts gathered to discuss recent developments in (astro)particle physics, phenomenology, cosmology, string theory, and quantum information. Topics included the assessment of the Standard Model, searches beyond the Standard Model at intensity-frontier experiments, high-energy astrophysical neutrinos, bridging LHC physics and cosmology with the Higgs boson, quantum generative models in high-energy physics, heavy quarks and effective field theories in lattice QCD, results and future prospects of LIGO-Virgo-KAGRA, neutron stars as axion laboratories, emergent higher-form symmetries in phases of matter, spacetime wormholes in quantum gravity, and concluded with an IFT Christmas reception.

https://www.ift.uam-csic.es/en/events/xxviii-ift-xmas-workshop

Seminarios ❍ Seminars

11/01/2021
'Entanglement, Holography and Tensor Networks'
Javier Molina Vilaplana
https://www.ift.uam-csic.es/en/events/entanglement-holography-and-tensor-networks

12/01/2021
'Pole skipping and related probes away from maximal chaos'
Mark Mezei
https://www.ift.uam-csic.es/en/events/pole-skipping-and-related-probes-away-maximal-chaos

14/01/2021
'Quantum thermal states on the lattice: correlations, area laws and tensor network representations'
Alvaro Martín Alhambra
https://www.ift.uam-csic.es/en/events/quantum-thermal-states-lattice-correlations-area-laws-and-tensor-network-representations

18/01/2021
'New Directions for Light Dark Matter'
Yonit Hochberg
https://www.ift.uam-csic.es/en/events/new-directions-light-dark-matter

19/01/2021
'NEXT HIDDeN WEBINAR: "Making the Universe at 20 MeV"'
Gilly Elor
https://www.ift.uam-csic.es/en/events/next-hidden-webinar-making-universe-20-mev-0

21/01/2021
'Symmetries of black hole perturbations'
Luca Santoni
https://www.ift.uam-csic.es/en/events/symmetries-black-hole-perturbations

26/01/2021
'What attracts to attractors?'
Wilke Van Der Schee
https://www.ift.uam-csic.es/en/events/what-attracts-attractors

28/01/2021
Massless positivity
Anna Tokareva
https://www.ift.uam-csic.es/en/events/massless-positivity

01/02/2021
'Multiscalar models - theoretical puzzles and LHC searches'
Pedro Ferreira
https://www.ift.uam-csic.es/en/events/multiscalar-models-theoretical-puzzles-and-lhc-searches

02/02/2021
'NEXT HIDDeN WEBINAR: "A Dark Seesaw at Low Energy Experiments"'
Matheus Hostert
https://www.ift.uam-csic.es/en/events/next-hidden-webinar-dark-seesaw-low-energy-experiments

04/02/2021
'Aspects of Traversable Wormholes'
Marija Tomasevic
https://www.ift.uam-csic.es/en/events/aspects-traversable-wormholes

08/02/2021
'Probing Inflation with Primordial Messengers'
Matteo Fasiello
https://www.ift.uam-csic.es/en/events/probing-inflation-primordial-messengers

09/02/2021
'HOLOTUBE: Quantum Gravity in the Lab'
Brian Swingle
https://www.ift.uam-csic.es/en/events/holotube-quantum-gravity-lab

15/02/2021
'Dark matter goes nuclear: overhauling thermal decoupling at the TeV scale with bound states'
Kalliopi Petraki
https://www.ift.uam-csic.es/en/events/dark-matter-goes-nuclear-overhauling-thermal-decoupling-tev-scale-bound-states

16/02/2021
'HOLOTUBE: Page curve for holographic moving mirror'
Tadashi Takayanagi
https://www.ift.uam-csic.es/en/events/holotube-page-curve-holographic-moving-mirror

16/02/2021
'NEXT HIDDeN WEBINAR: "Long Range Interactions in Cosmology: Implications for Neutrinos"'
Jordi Salvado
https://www.ift.uam-csic.es/en/events/next-hidden-webinar-long-range-interactions-cosmology-implications-neutrinos

22/02/2021
'Precision Physics at the LHC: why and how'
Giulia Zanderighi
https://www.ift.uam-csic.es/en/events/precision-physics-lhc-why-and-how

24/02/2021
'A Topological Data Analysis perspective on coronavirus evolution'
Raul Rabadan
https://www.ift.uam-csic.es/en/events/topological-data-analysis-perspective-coronavirus-evolution

01/03/2021
'Direct detection window to light new physics'
David Cerdeño
https://www.ift.uam-csic.es/en/events/direct-detection-window-light-new-physics

02/03/2021
'HIDDeN WEBINAR: "Dark matter scattering in dielectrics"'
Tongyan Lin
https://www.ift.uam-csic.es/en/events/hidden-webinar-dark-matter-scattering-dielectrics

08/03/2021
'Precision big bang nucleosynthesis and the status of deuterium'
Cyril Pitrou
https://www.ift.uam-csic.es/en/events/precision-big-bang-nucleosynthesis-and-status-deuterium

09/03/2021
'HOLOTUBE: Causal symmetry breaking: from quantum chaos to wormholes'
Julian Sonner
https://www.ift.uam-csic.es/en/events/holotube-causal-symmetry-breaking-quantum-chaos-wormholes

10/03/2021
'Topologically Frustrated Spin Chains'
Vanja Maric
https://www.ift.uam-csic.es/en/events/topologically-frustrated-spin-chains

16/03/2021
'HOLOTUBE: Bubble Dynamics from Holography'
David Mateos
https://www.ift.uam-csic.es/en/events/holotube-bubble-dynamics-holography

16/03/2021
'HIDDeN WEBINAR: "The Cosmic Axion Background"'
Jeff Dror
https://www.ift.uam-csic.es/en/events/hidden-webinar-cosmic-axion-background

18/03/2021
'Circular polarisation of gamma rays as a probe of DM-cosmic ray electron interactions'
Marina Cermeño
https://www.ift.uam-csic.es/en/events/circular-polarisation-gamma-rays-probe-dm-cosmic-ray-electron-interactions

22/03/2021
'Top-pourri: from current anomalies to future colliders including machine learning'
J.A. Aguilar Saavedra
https://www.ift.uam-csic.es/en/events/top-pourri-current-anomalies-future-colliders-including-machine-learning

25/03/2021
'Hunting Dark Matter Signals at the LHC with neural networks'
Andres Perez
https://www.ift.uam-csic.es/en/events/hunting-dark-matter-signals-lhc-neural-networks

29/03/2021
'Dark Energy, from theory to data'
Valeria Pettorino
https://www.ift.uam-csic.es/en/events/dark-energy-theory-data

30/03/2021
'HIDDeN WEBINAR: "A heavy axion 'massless up' from partial compositeness"'
Rick. S. Gupta
https://www.ift.uam-csic.es/en/events/hidden-webinar-heavy-axion-massless-partial-compositeness

08/04/2021
'Cosmological implications of electroweak vacuum instability: constraints on the Higgs curvature coupling from inflation'
Andreas Mantziris
https://www.ift.uam-csic.es/en/events/cosmological-implications-electroweak-vacuum-instability-constraints-higgs-curvature-coupling

13/04/2021
'HOLOTUBE: An effective field theory of stochastic diffusion from gravity'
Mukund Rangamani
https://www.ift.uam-csic.es/en/events/holotube-effective-field-theory-stochastic-diffusion-gravity

13/04/2021
'HIDDeN WEBINAR: "Implications of the new measurements of b > s mumu decays"'
Jorge Martin Camalich
https://www.ift.uam-csic.es/en/events/hidden-webinar-implications-new-measurements-b-s-mumu-decays

15/04/2021
'Constraining the early universe with ultralight primordial black holes and vice-versa'
Theodoros Papanikolaou
https://www.ift.uam-csic.es/en/events/constraining-early-universe-ultralight-primordial-black-holes-and-vice-versa

19/04/2021
'The imprint of dark energy and neutrinos on cosmic voids'
Carmelita Carbone
https://www.ift.uam-csic.es/en/events/imprint-dark-energy-and-neutrinos-cosmic-voids

20/04/2021
'Bounds on transport from univalence'
Sašo Grozdanov
https://www.ift.uam-csic.es/en/events/bounds-transport-univalence

22/04/2021
'Fermionic Dark Matter Profiles'
Carlos Arguelles
https://www.ift.uam-csic.es/en/events/fermionic-dark-matter-profiles

26/04/2021
'The new exotics Zcs(3085), Zcs(4003), Y(4230) decays and Flavour SU(3)'
Luciano Maiani
https://www.ift.uam-csic.es/en/events/new-exotics-zcs3085-zcs4003-y4230-decays-and-flavour-su3

27/04/2021
'HIDDeN WEBINAR: "Discovering Lepton Flavour Universality Violating New Physics"'
Andreas Crivellin
https://www.ift.uam-csic.es/en/events/hidden-webinar-discovering-lepton-flavour-universality-violating-new-physics

27/04/2021
'HOLOTUBE: On systems of maximal quantum chaos'
Mike Blake
https://www.ift.uam-csic.es/en/events/holotube-systems-maximal-quantum-chaos

04/05/2021
'HOLOTUBE: Applying gauge/gravity duality to neutron stars'
Matti Jarvinen
https://www.ift.uam-csic.es/en/events/holotube-applying-gaugegravity-duality-neutron-stars

10/05/2021
'The muon g-2 in the standard model: a review of the calculation of hadronic contributions'
Gilberto Colangelo
https://www.ift.uam-csic.es/en/events/muon-g-2-standard-model-review-calculation-hadronic-contributions

11/05/2021
'HOLOTUBE: Stochastic Gravity and Turbulence'
Amos Yarom
https://www.ift.uam-csic.es/en/events/holotube-stochastic-gravity-and-turbulence

13/05/2021
'Massive sterile neutrinos in single and double beta decays'
Xabier Marcano
https://www.ift.uam-csic.es/en/events/massive-sterile-neutrinos-single-and-double-beta-decays

17/05/2021
'Consistent equivalence principle tests with fast radio bursts'
Robert Reischke
https://www.ift.uam-csic.es/en/events/consistent-equivalence-principle-tests-fast-radio-bursts

18/05/2021
'HOLOTUBE: A Mellin-Barnes Approach to Scattering in de Sitter Space'
Charlotte Sleight
https://www.ift.uam-csic.es/en/events/holotube-mellin-barnes-approach-scattering-de-sitter-space

19/05/2021
'Black Hole Imaging: First results and future vision'
Sheperd Doeleman
https://www.ift.uam-csic.es/en/events/black-hole-imaging-first-results-and-future-vision

20/05/2021
'Agnostic cosmology and multitasking the growth of cosmological structures'
Louis Perenon
https://www.ift.uam-csic.es/en/events/agnostic-cosmology-and-multitasking-growth-cosmological-structures

24/05/2021
'The State of the B Anomalies'
Wolfgang Altmannshofer
https://www.ift.uam-csic.es/en/events/state-b-anomalies

25/05/2021
'HOLOTUBE: Stabilization of the extended horizons'
Alex Buchel
https://www.ift.uam-csic.es/en/events/holotube-stabilization-extended-horizons

27/05/2021
'Searching for evidence of TeV-scale electron/positron acceleration by Millisecond Pulsars'
O. Macias Ramirez
https://www.ift.uam-csic.es/en/events/searching-evidence-tev-scale-electronpositron-acceleration-millisecond-pulsars

31/05/2021-04/06/2021
'g-2Days21'
https://www.ift.uam-csic.es/en/events/g-2days21

01/06/2021
'HOLOTUBE: The high temperature behavior of QFT'
Zohar Komargodski
https://www.ift.uam-csic.es/en/events/holotube-high-temperature-behavior-qft

07/06/2021
'The impact of halo and subhalo properties on dark matter searches'
Angeles Moline
https://www.ift.uam-csic.es/en/events/impact-halo-and-subhalo-properties-dark-matter-searches

08/06/2021
'HIDDeN WEBINAR: "Hadronic contributions to the muon g-2"'
Gregorio Herdoiza
https://www.ift.uam-csic.es/en/events/hidden-webinar-hadronic-contributions-muon-g-2

08/06/2021
'HOLOTUBE: Fingerprints of quantum criticality in locally resolved transport'
Andrew Lucas
https://www.ift.uam-csic.es/en/events/holotube-fingerprints-quantum-criticality-locally-resolved-transport

10/06/2021
'Positive magnetoresistance induced by hydrodynamic fluctuations in chiral media'
Noriyuki Sogabe
https://www.ift.uam-csic.es/en/events/positive-magnetoresistance-induced-hydrodynamic-fluctuations-chiral-media

15/06/2021
'HOLOTUBE:Holography and hydrodynamics of 2-group global symmetry'
Nick Poovuttikul
https://www.ift.uam-csic.es/en/events/holotubeholography-and-hydrodynamics-2-group-global-symmetry

17/06/2021
'Bayesian Inference for Four tops at the LHC'
Manuel Szewc
https://www.ift.uam-csic.es/en/events/bayesian-inference-four-tops-lhc

22/06/2021
'HOLOTUBE: Mean String Field Theory'
Nabil Iqbal
https://www.ift.uam-csic.es/en/events/holotube-mean-string-field-theory

25/06/2021
'HES: Gauge-invariant TMD factorization for Drell-Yan hadronic tensor at small x'
Ian Balitsky
https://www.ift.uam-csic.es/en/events/hes-gauge-invariant-tmd-factorization-drell-yan-hadronic-tensor-small-x

29/06/2021
'Collective Monte Carlo updates through tensor network renormalization'
Sofyan Iblisdir
https://www.ift.uam-csic.es/en/events/collective-monte-carlo-updates-through-tensor-network-renormalization

06/07/2021
'HOLOTUBE: JT gravity with defects and the Aharonov-Bohm effect'
Kenta Suzuki
https://www.ift.uam-csic.es/en/events/holotube-jt-gravity-defects-and-aharonov-bohm-effect

13/07/2021
'HOLOTUBE: Is the Chiral Magnetic Effect Fast Enough?'
Karl Landsteiner
https://www.ift.uam-csic.es/en/events/holotube-chiral-magnetic-effect-fast-enough

20/07/2021
'HOLOTUBE: The p-spin glass model: a holographer's perspective'
Felix Haehl
https://www.ift.uam-csic.es/en/events/holotube-p-spin-glass-model-holographer%E2%80%99s-perspective

22/07/2021
'Self-Organised Localisation'
Tevong You
https://www.ift.uam-csic.es/en/events/self-organised-localisation

13/09/2021
'Sauter-Schwinger effect in superconductors'
Andrea Amoretti
https://www.ift.uam-csic.es/en/events/sauter-schwinger-effect-superconductors

20/09/2021
'Emergent geometry from entanglement distribution'
Sudipto Singha
https://www.ift.uam-csic.es/en/events/emergent-geometry-entanglement-distribution

23/09/2021
'Flavour-violating decays of leptons into axion-like particles'
Lorenzo Calibbi
https://www.ift.uam-csic.es/en/events/flavour-violating-decays-leptons-axion-particles

30/09/2021
'Gravitational wave cosmology beyond general relativity'
Charles Dalang
https://www.ift.uam-csic.es/en/events/gravitational-wave-cosmology-beyond-general-relativity

04/10/2021
'Primordial standard clocks and CMB residual anomalies'
Matteo Braglia
https://www.ift.uam-csic.es/en/events/primordial-standard-clocks-and-cmb-residual-anomalies

05/10/2021
'NEXT HIDDeN WEBINAR: The Neutrino Option'
Ilaria Brivio
https://www.ift.uam-csic.es/en/events/next-hidden-webinar-neutrino-option

07/10/2021
'CP-odd flavour invariants in the SMEFT'
Quentin Bonnefoy
https://www.ift.uam-csic.es/en/events/cp-odd-flavour-invariants-smeft

14/10/2021
'The geoSMEFT and some applications'
Tyler Corbett
https://www.ift.uam-csic.es/en/events/geosmeft-and-some-applications

15/10/2021
'Asymptotic symmetries at spatial infinity'
Javier Matulich
https://www.ift.uam-csic.es/en/events/asymptotic-symmetries-spatial-infinity

19/10/2021
'NEXT HIDDeN WEBINAR: Search for anomalous single-photon production in MicroBooNE as a first test of the MiniBooNE low-energy excess.'
Mark Ross-Lonergan
https://www.ift.uam-csic.es/en/events/next-hidden-webinar-search-anomalous-single-photon-production-microboone-first-test-miniboone

21/10/2021
'Cosmological anomalies shedding light on the dark sector'
Guillermo Franco Abellan
https://www.ift.uam-csic.es/en/events/cosmological-anomalies-shedding-light-dark-sector

25/10/2021
'SDSS: 20 years of cosmological results'
Eva Mueller
https://www.ift.uam-csic.es/en/events/sdss-20-years-cosmological-results

28/10/2021
'Violations of weak cosmic censorship in black hole collisions'
Tomas Andrade
https://www.ift.uam-csic.es/en/events/violations-weak-cosmic-censorship-black-hole-collisions

02/11/2021
'NEXT HIDDeN WEBINAR: Energy-Dependent Neutrino Mixing Parameters at Oscillation Experiments'
Vedran Brdar
https://www.ift.uam-csic.es/en/events/next-hidden-webinar-energy-dependent-neutrino-mixing-parameters-oscillation-experiments

04/11/2021
'Damping of pseudo-Goldstone bosons'
Blaise Goutereaux
https://www.ift.uam-csic.es/en/events/damping-pseudo-goldstone-bosons

08/11/2021
'Gravitational waves from first-order phase transitions: A hybrid simulation, and signal enhancement from density perturbations'
Ryusuke Jinno
https://www.ift.uam-csic.es/en/events/gravitational-waves-first-order-phase-transitions-hybrid-simulation-and-signal-enhancement

11/11/2021
'New directions in the SMEFT'
Maria Ramos
https://www.ift.uam-csic.es/en/events/new-directions-smeft

15/11/2021
'Flavor anomalies, and the Bc lifetime'
Benjamin Grinstein
https://www.ift.uam-csic.es/en/events/flavor-anomalies-and-bc-lifetime

16/11/2021
'NEXT HIDDeN WEBINAR: The sunny side of dark matter direct detection'
Josef Pradler
https://www.ift.uam-csic.es/en/events/next-hidden-webinar-sunny-side-dark-matter-direct-detection

18/11/2021
'Vacuum trapping and electroweak symmetry non-restoration in the early universe'
Olalla Olea
https://www.ift.uam-csic.es/en/events/vacuum-trapping-and-electroweak-symmetry-non-restoration-early-universe

22/11/2021
'Measuring anisotropic stress with relativistic effects'
Camille Bonvin
https://www.ift.uam-csic.es/en/events/measuring-anisotropic-stress-relativistic-effects

25/11/2021
'Detecting, Discovering and Measuring Dark Matter around Black Holes with Gravitational Waves'
Bradley Kavanagh
https://www.ift.uam-csic.es/en/events/detecting-discovering-and-measuring-dark-matter-around-black-holes-gravitational-waves

29/11/2021
'Quantum Simulation of the Standard Model and Beyond'
Dorota Grabowska
https://www.ift.uam-csic.es/en/events/quantum-simulation-standard-model-and-beyond

30/11/2021
'NEXT HIDDeN WEBINAR: Sliding Naturalness'
Daniele Teresi
https://www.ift.uam-csic.es/en/events/next-hidden-webinar-sliding-naturalness

01/12/2021
'Recent advances in non-relativistic quantum gravity'
Eric Bergshoeff`
https://www.ift.uam-csic.es/en/events/recent-advances-non-relativistic-quantum-gravity

02/12/2021
'On the construction of theories of composite dark matter'
Sean Mee
https://www.ift.uam-csic.es/en/events/construction-theories-composite-dark-matter

09/12/2021
'Emergent strings in a finite universe'
Ivano Basile
https://www.ift.uam-csic.es/en/events/emergent-strings-finite-universe

13/12/2021
'A journey in cosmic web filaments'
Nabila Aghanim
https://www.ift.uam-csic.es/en/events/journey-cosmic-web-filaments

14/12/2021
'NEXT HIDDeN WEBINAR: Quantum field theories without infinities and naturalness'
Mikhail Shaposhnikov
https://www.ift.uam-csic.es/en/events/next-hidden-webinar-quantum-field-theories-without-infinities-and-naturalness

20/12/2021
'Quantum Computing for High Energy Physics'
Christian Bauer
https://www.ift.uam-csic.es/en/events/quantum-computing-high-energy-physics

10/01/2022
'Very Broadly, The Geometric SMEFT description of curved Higgs Field Space(s)'
Michael Trott
https://www.ift.uam-csic.es/en/events/very-broadly-geometric-smeft-description-curved-higgs-field-spaces

11/01/2022
'NEXT HIDDeN WEBINAR: EFT at FASERv: An experiment to probe them all'
Zahra Tabrizi
https://www.ift.uam-csic.es/en/events/next-hidden-webinar-eft-faserv-experiment-probe-them-all

13/01/2022
'Entanglement and quantum tomography with top quarks at the LHC'
Juan Ramón Muñoz de Nova
https://www.ift.uam-csic.es/en/events/entanglement-and-quantum-tomography-top-quarks-lhc

17/01/2022
'Physics at a future e+e- collider'
Jenny List
https://www.ift.uam-csic.es/en/events/physics-future-ee-collider

20/01/2022
'Fermionic Dark Matter and Self Interactions'
Rafael Yunis
https://www.ift.uam-csic.es/en/events/fermionic-dark-matter-and-self-interactions

24/01/2022
'Geometrical aspects of stochastic inflation: a path (integral) to the discretisation ambiguity and its resolution'
Lucas Pinol
https://www.ift.uam-csic.es/en/events/geometrical-aspects-stochastic-inflation-path-integral-discretisation-ambiguity-and-its

27/01/2022
'Using Machine Learning techniques in phenomenological studies in flavour physics'
Jorge Alda
https://www.ift.uam-csic.es/en/events/using-machine-learning-techniques-phenomenological-studies-flavour-physics

31/01/2022
'Effective Field Theory: Limitations and Avenues for New Physics Discovery'
Christoph Englert
https://www.ift.uam-csic.es/en/events/effective-field-theory-limitations-and-avenues-new-physics-discovery

07/02/2022
'Swampland Conjectures from Black Holes and Finiteness'
Irene Valenzuela
https://www.ift.uam-csic.es/en/events/swampland-conjectures-black-holes-and-finiteness

10/02/2022
'Lighting the dark ages of inflation: features in the stochastic gravitational wave background'
Jacopo Fumagalli
https://www.ift.uam-csic.es/en/events/lighting-dark-ages-inflation-features-stochastic-gravitational-wave-background

15/02/2022
'NEXT HIDDeN WEBINAR: Thermal Squeezeout for Strongly Interacting Dark Matter'
Tracy Slatyer
https://www.ift.uam-csic.es/en/events/next-hidden-webinar-thermal-squeezeout-strongly-interacting-dark-matter

16/02/2022
'Prospects for understanding the physics of the Universe'
Hiranya Peiris
https://www.ift.uam-csic.es/en/events/prospects-understanding-physics-universe

17/02/2022
'The Propagator Matrix Reloaded'
João Melo
https://www.ift.uam-csic.es/en/events/propagator-matrix-reloaded

21/02/2022
'Non-perturbative instability of mIIA on AdS_4 x S^6'
Giuseppe Dibitetto
https://www.ift.uam-csic.es/en/events/non-perturbative-instability-miia-ads4-x-s6

23/02/2022
'Galaxy evolution and cosmology using gamma rays observed with Fermi-LAT'
Alberto Domínguez
https://www.ift.uam-csic.es/en/events/galaxy-evolution-and-cosmology-using-gamma-rays-observed-fermi-lat

23/02/2022
'HydroClub: Hydrodynamic description of Landau instabilities in superfluid'
Filippo Sottovia
https://www.ift.uam-csic.es/en/events/hydroclub-hydrodynamic-description-landau-instabilities-superfluid

24/02/2022
'Supersymmetry breaking and one-loop consequences'
Thibaut Coudarchet
https://www.ift.uam-csic.es/en/events/supersymmetry-breaking-and-one-loop-consequences

28/02/2022
'First-order phase transitions and gravitational waves in the early Universe: from microphysics to macrophysics'
Ryusuke Jinno
https://www.ift.uam-csic.es/en/events/first-order-phase-transitions-and-gravitational-waves-early-universe-microphysics

03/03/2022
'Into the dark sector: the search for feebly interacting particles'
Jean-Loup Tastet
https://www.ift.uam-csic.es/en/events/dark-sector-search-feebly-interacting-particles

07/03/2022
'Z'-explorer: confronting Z' models against LHC data'
Rosa María Sandá Seoane
https://www.ift.uam-csic.es/en/events/z-explorer-confronting-z-models-against-lhc-data

/03/2022
'Surprises from the Expansion of the Universe'
Adam Riess
https://www.ift.uam-csic.es/en/events/surprises-expansion-universe

14/03/2022
'High-energy cosmic messengers as probes of fundamental physics and cosmology'
Rafael Alves Batista
https://www.ift.uam-csic.es/en/events/high-energy-cosmic-messengers-probes-fundamental-physics-and-cosmology

16/03/2022
'Quantum entanglement in high energy physics'
Dmitri Kharzeev
https://www.ift.uam-csic.es/en/events/quantum-entanglement-high-energy-physics

17/03/2022
'Was There an Electroweak Phase Transition?'
Michael Ramsey Musolf
https://www.ift.uam-csic.es/en/events/was-there-electroweak-phase-transition

21/03/2022
'Numerical simulations for cosmology'
Raúl Angulo
https://www.ift.uam-csic.es/en/events/numerical-simulations-cosmology

24/03/2022
'The distance duality relation: violations, constraints and biases'
Natalie Hogg
https://www.ift.uam-csic.es/en/events/distance-duality-relation-violations-constraints-and-biases

28/03/2022
'Galaxy clustering analyses with the photometric sample of the Euclid mission'
Isaac Tutusaus
https://www.ift.uam-csic.es/en/events/galaxy-clustering-analyses-photometric-sample-euclid-mission

31/03/2022
'Hidden symmetries in the dynamics of perturbed Schwarzschild Black Holes'
Carlos Fdez Sopuerta
https://www.ift.uam-csic.es/en/events/hidden-symmetries-dynamics-perturbed-schwarzschild-black-holes

04/04/2022
'Phenomenology of Deep Learning'
Nayara Fonseca
https://www.ift.uam-csic.es/en/events/phenomenology-deep-learning

06/04/2022
'Quo Vadis DM?'
Antonio Delgado
https://www.ift.uam-csic.es/en/events/quo-vadis-dm

07/04/2022
'The quest for the diffuse gamma ray emission from galaxy clusters'
Rémi Adam
https://www.ift.uam-csic.es/en/events/quest-diffuse-gamma-ray-emission-galaxy-clusters

20/04/2022
'Supernova Explosions near the Earth'
John Ellis
https://www.ift.uam-csic.es/en/events/supernova-explosions-near-earth

21/04/2022
'Thermal Order in 3d'
Ritam Sinha
https://www.ift.uam-csic.es/en/events/thermal-order-3d

25/04/2022
'Quasinormal modes and pole-skipping in holographic theories'
Richard Davison
https://www.ift.uam-csic.es/en/events/quasinormal-modes-and-pole-skipping-holographic-theories

28/04/2022
'The gravitational wave and short gamma-ray burst GW170817/SHB170817A, not your everyday binary neutron star merger'
Alvaro de Rujula
https://www.ift.uam-csic.es/en/events/gravitational-wave-and-short-gamma-ray-burst-gw170817shb170817a-not-your-everyday-binary

03/05/2022
'Dilaton chiral perturbation theory and applications'
Maarten Golterman
https://www.ift.uam-csic.es/en/events/dilaton-chiral-perturbation-theory-and-applications

05/05/2022
'Gearing up for the next generation of LFV experiments, via on-shell methods'
Mehmet Asım Gümüş
https://www.ift.uam-csic.es/en/events/gearing-next-generation-lfv-experiments-shell-methods

09/05/2022
'Hunting from transient to continuous gravitational wave signals'
Alicia M. Sintes Olives
https://www.ift.uam-csic.es/en/events/hunting-transient-continuous-gravitational-wave-signals

11/05/2022
'The Second Kind of Impossible: The Extraordinary Search for Natural Quasicrystals'
Paul Steinhardt
https://www.ift.uam-csic.es/en/events/second-kind-impossible-extraordinary-search-natural-quasicrystals

12/05/2022
'Rethinking Cosmology: Why it's time to take the "big bang" out of the big bang theory'
Paul Steinhardt
https://www.ift.uam-csic.es/en/events/rethinking-cosmology-why-it%E2%80%99s-time-take-%E2%80%9Cbig-bang%E2%80%9D-out-big-bang-theory

17/05/2022
'Bootstrap for lattice Yang-Mills theory'
Vladimir Kazakov
https://www.ift.uam-csic.es/en/events/bootstrap-lattice-yang-mills-theory

18/05/2022
'The Many Faces of General Relativity: Implications for Inflation and Dark Matter'
Sebastian Zell
https://www.ift.uam-csic.es/en/events/many-faces-general-relativity-implications-inflation-and-dark-matter

19/05/2022
'New ideas for the formation of primordial black holes'
Alex Kusenko
https://www.ift.uam-csic.es/en/events/new-ideas-formation-primordial-black-holes

23/05/2022
'Primordial Black Holes and Leptogenesis: An unexpected interplay'
Yuber F. Perez-Gonzalez
https://www.ift.uam-csic.es/en/events/primordial-black-holes-and-leptogenesis-unexpected-interplay

26/05/2022
'Why journalists don't understand science and why scientists don't understand science journalism'
Ernesto Lozano
https://www.ift.uam-csic.es/en/events/why-journalists-dont-understand-science-and-why-scientists-dont-understand-science-journalism

30/05/2022
'Neutrinos, reactors & anomalies'
Patrick Huber
https://www.ift.uam-csic.es/en/events/neutrinos-reactors-anomalies

02/06/2022
'Aspects of the QFT entropy cone'
Pablo Bueno
https://www.ift.uam-csic.es/en/events/aspects-qft-entropy-cone

06/06/2022
'Novel ways to probe effective neutrino interactions'
Julia Harz

09/06/2022
'The W-boson mass: experiment vs. theory'
Chris Hays / Alessandro Vicini / Georg Weiglein
https://www.ift.uam-csic.es/en/events/w-boson-mass-experiment-vs-theory

13/06/2022
'Efficiently probing the SMEFT interference'
Celine Degrande
https://www.ift.uam-csic.es/en/events/efficiently-probing-smeft-interference

20/06/2022
'Microlensing searches for compact dark matter'
Lukasz Wyrzykowski
https://www.ift.uam-csic.es/en/events/microlensing-searches-compact-dark-matter

23/06/2022
'Asymptotic lattice spacing dependence for spectral quantities with Wilson / GW quarks and beyond'
Nikolai Husung
https://www.ift.uam-csic.es/en/events/asymptotic-lattice-spacing-dependence-spectral-quantities-wilson-gw-quarks-and-beyond

27/06/2022
'Review of Holographic Models of Inflationary Cosmology'
Tom Banks
https://www.ift.uam-csic.es/en/events/review-holographic-models-inflationary-cosmology

30/06/2022
'Domain walls in super-Yang-Mills'
Diego Delmastro
https://www.ift.uam-csic.es/en/events/domain-walls-super-yang-mills

05/07/2022
'The unitarity fit and lepton flavour violation or Much Ado About Nothing'
Guido Martinelli
https://www.ift.uam-csic.es/en/events/unitarity-fit-and-lepton-flavour-violation-or-much-ado-about-nothing

07/07/2022
'Target Space Entanglement And Gauge-Gravity Duality'
Sumit Das
https://www.ift.uam-csic.es/en/events/target-space-entanglement-and-gauge-gravity-duality

01/09/2022
'The complexity of quantum matter'
Alvaro Martín Alhambra
https://www.ift.uam-csic.es/en/events/complexity-quantum-matter

08/09/2022
'Direct search for supernova axions'
Yoshiki Kanazawa
https://www.ift.uam-csic.es/en/events/direct-search-supernova-axions

13/09/2022
'What happens to apparent horizons when black holes collide?'
Robie A. Hennigar
https://www.ift.uam-csic.es/en/events/what-happens-apparent-horizons-when-black-holes-collide

26/09/2022
'Some topics of fundamental physics attainable with IACTs'
Michele Doro
https://www.ift.uam-csic.es/en/events/some-topics-fundamental-physics-attainable-iacts

27/09/2022-29/09/2022
'Quantum Error Correction and Fault-Tolerance: From Concepts to Experiments'
Prof. Markus Müller
https://www.ift.uam-csic.es/en/events/quantum-error-correction-and-fault-tolerance-concepts-experiments

27/09/2022
'Broken Symmetry Clues for Fundamental Physics'
Matthew Reece
https://www.ift.uam-csic.es/en/events/broken-symmetry-clues-fundamental-physics

29/09/2022
'Conformal Renormalization of AdS gravity'
Rodrigo Olea
https://www.ift.uam-csic.es/en/events/conformal-renormalization-ads-gravity

03/10/2022-28/10/2022
'Beyond the Standard Models: Particle Physics meets Cosmology'
https://www.ift.uam-csic.es/en/events/beyond-standard-models-particle-physics-meets-cosmology

04/10/2022
'Investigating phase transitions with machine learning methods'
Biagio Lucini
https://www.ift.uam-csic.es/en/events/investigating-phase-transitions-machine-learning-methods

06/10/2022
'Lessons for dark matter from nonstandard cosmologies'
Leszek Roszkowski
https://www.ift.uam-csic.es/en/events/lessons-dark-matter-nonstandard-cosmologies

10/10/2022
'Magnetic scattering: pairwise little group and pairwise helicity'
Csaba Csaki
https://www.ift.uam-csic.es/en/events/magnetic-scattering-pairwise-little-group-and-pairwise-helicity

13/10/2022
'Non-perturbative decoupling of heavy quarks and the determination of alpha_s(m_Z)'
Stefan Sint
https://www.ift.uam-csic.es/en/events/non-perturbative-decoupling-heavy-quarks-and-determination-alphasmz

17/10/2022
'Machine Learning applied to Cosmology'
Aurélien Decelle
https://www.ift.uam-csic.es/en/events/machine-learning-applied-cosmology

24/10/2022
'Towards interpretable pattern extraction from datasets using energy based models'
Beatriz Seoane Bartolomé
https://www.ift.uam-csic.es/en/events/towards-interpretable-pattern-extraction-datasets-using-energy-based-models

27/10/2022
'Artificial Intelligence 2030'
Carles Sierra
https://www.ift.uam-csic.es/en/events/artificial-intelligence-2030

03/11/2022
'EW baryogenesis in the aligned two Higgs doublet model'
Shinya Kanemura

07/11/2022
'Towards a microscopic description of 212Po alpha-decay'
Tatiana Tarutina
https://www.ift.uam-csic.es/en/events/towards-microscopic-description-212po-alpha-decay

08/11/2022
'Radiative corrections and threshold resummed predictions to pseudoscalar Higgs boson production'
Arunima Bhattacharya
https://www.ift.uam-csic.es/en/events/radiative-corrections-and-threshold-resummed-predictions-pseudoscalar-higgs-boson-production

10/11/2022
'Emergent Fractons'
Daniele Musso
https://www.ift.uam-csic.es/en/events/emergent-fractons

14/11/2022
'Fundamental Physics and Cosmology with the Einstein Telescope'
Michele Maggiore
https://www.ift.uam-csic.es/en/events/fundamental-physics-and-cosmology-einstein-telescope

15/11/2022
'Adventures in Flatland: Quantum Criticality in the 2+1d Thirring Model'
Prof. Simon Hands
https://www.ift.uam-csic.es/en/events/adventures-flatland-quantum-criticality-21d-thirring-model

17/11/2022
'UV asymptotics of the generating functional of 1-loop glueball correlators in large-N Yang-Mills theory'
Francesco Scardino
https://www.ift.uam-csic.es/en/events/uv-asymptotics-generating-functional-1-loop-glueball-correlators-large-n-yang-mills-theory

18/11/2022
'It's not my body, but the way you look at me'
Isabel López Calderón
https://www.ift.uam-csic.es/en/events/its-not-my-body-way-you-look-me

21/11/2022
'Dark sectors searches with the NA64 experiment at CERN'
Laura Molina Bueno
https://www.ift.uam-csic.es/en/events/dark-sectors-searches-na64-experiment-cern

22/11/2022
'Hardware efficient quantum simulation of non-abelian gauge theories with qudits on Rydberg platforms'
Daniel Gonzalez-Cuadra
https://www.ift.uam-csic.es/en/events/hardware-efficient-quantum-simulation-non-abelian-gauge-theories-qudits-rydberg-platforms

24/11/2022
'Search for High Frequency GW with the GRAHAL experiment'
Killian Martineau
https://www.ift.uam-csic.es/en/events/search-high-frequency-gw-grahal-experiment

01/12/2022
'Ending inflation with a bang: Higgs vacuum decay in R + R^2 gravity'
Andreas Mantziris
https://www.ift.uam-csic.es/en/events/ending-inflation-bang-higgs-vacuum-decay-r-r2-gravity

Visitantes ❍ Visitors

Alejandro Vilar López	08/01/2021	31/03/2021
Diego García Martín	04/01/2021	21/01/2021
Fernando Romero	06/04/2021	07/04/2021
David Albandea	06/04/2021	07/04/2021
Pilar Hernández	06/04/2021	07/04/2021
Javier Rubio	31/05/2021	11/06/2021
Emanuele A. Bagnaschi	21/08/2021	05/09/2021
Andrea Amoretti	06/09/2021	27/09/2021
Charles Dalang	27/09/2021	04/10/2021
Ryusuke Jinno	30/09/2021	14/11/2021
Juan Antonio Aguilar	30/09/2021	08/01/2022
Roberta Angius	01/10/2021	14/11/2021
Quentin Bonnefoy	05/10/2021	10/10/2021
Thibaut Coudarchet	09/10/2021	31/10/2021
Mariano Quirós	11/10/2021	31/10/2021
Luca Mettori	11/10/2021	14/10/2021
Javier Matulish	13/10/2021	21/10/2021
Tyler Corbet	14/10/2021	14/10/2021
Javier Martín García	17/10/2021	22/10/2021
Antonio Delgado	16/10/2021	23/10/2021
Guillermo Francos Abellán	20/10/2021	21/10/2021
Mikel Alvarez Urquiola	21/10/2021	21/10/2021
Marina Cermeño Gavilán	21/10/2021	22/10/2021
Benjamin Grinstein	23/10/2021	08/12/2021
Carlos Arguelles	24/10/2021	31/10/2021
Tomás Andrade	25/10/2021	02/11/2021

Frederic NOWACKI	25/10/2021	02/11/2021
André LeClair	01/11/2021	15/11/2021
Blaise Goutéraux	01/11/2021	08/11/2021
Luca Melotti	03/11/2021	14/11/2021
Gerardo Aldazáal	12/11/2021	04/12/2021
Rathul Nath Raveendran	15/11/2021	18/12/2021
Nishal Rai	15/11/2021	03/12/2021
Fabrizzio Rizzi	15/11/2021	19/11/2021
Maria Olalla Olea Romacho	16/11/2021	21/11/2021
Pablo Quillez	16/11/2021	07/12/2021
Anamaría Font	17/11/2021	29/11/2021
Stefan Theisen	17/11/2021	29/11/2021
Sandra Robles	20/11/2021	18/12/2021
Bradley Kavanagh	24/11/2021	28/11/2021
Javier Matulich	24/11/2021	01/12/2021
Salvador Urrea	28/11/2021	03/12/2021
Eric Bergshoeff	29/11/2021	03/12/2021
Ivano Basile	09/12/2021	15/12/2021
Pablo Cano	12/12/2021	23/12/2021
Sk Jahanur Hoque	12/12/2021	19/12/2021
Andrew Cheek	12/12/2021	18/12/2021
Fracnco Pazzella	14/12/2021	18/12/2021
Fernando Arias	16/12/2021	16/12/2021
Alvaro Herraez	20/12/2021	18/01/2022

Juan Pedraza Avella	10/01/2022	16/01/2022
Eduardo Gonzolo adía	10/01/2022	14/01/2022
Rebeca Collins	10/01/2022	15/01/2023
Sandra Robles	15/01/2022	14/02/2022
Christian Copetti	23/01/2022	28/01/2022
Matteno Martinelli	24/01/2022	30/01/2022
Nishal Rai	31/01/2022	25/02/2022
Joao Fonseca	07/02/2022	15/02/2022
Joao Paula da Mata	14/02/2022	26/02/2022
Filippo Sottovia	17/02/2022	01/03/2022
Oscar Lasso	19/02/2022	20/03/2022
Alvaro Herraez	25/02/2022	28/02/2022
Enrique Rico	01/03/2022	04/03/2022
Joao Fonseca	01/03/2022	30/11/2023
Yosef Nir	06/03/2022	11/03/2022
Salvador Rosauro	07/03/2022	11/03/2022
Antoione Lehebel	07/03/2022	08/03/2022
María Olalla Olea	12/03/2022	21/03/2022
Raul Angulo	20/03/2022	23/03/2022
Mauro Pieroni	24/03/2022	25/03/2022
Ferruccio Ferruglio	28/03/2022	06/04/2022
Carlos Fernández Sopuerta	31/03/2022	01/04/2022
Gioacchino Piazza	01/04/2022	31/05/2022
Jerome Dubail	03/04/2022	06/04/2022
Rémi Adam	02/04/2022	08-abr
Antonio Delgado	02/04/2022	09/04/2022
Mariano Quirós	04/04/2022	11/04/202
Mehmet Asim Gumus	18/04/2022	17/06/2022
Christian Diaz	18/04/2022	24/05/2022

María Olalla Olea	18/04/2022	30/06/2022
Mari Carmen Bañuls	19/04/2022	29/04/2022
Thomas Biekotter	20/04/2022	22/04/2022
Ritham Sinha	08/04/2022	06/05/2022
Joaquin Fillipe	28/04/2022	05/05/2022
Richard Davison	24/04/2022	29/04/2022
Sarah Ferraiuolo	25/04/2022	25/10/2022
Golterman Maarten	30/04/2022	04/05/2022
Matteo Baggioli	01/05/2022	11/06/2022
Soumangsu Bhusan Chakraborty	08/05/2022	11/05/2022
Alicia Sintes	09/05/2022	10/05/2022
Paul Steinhardt	11/05/2022	12/05/2022
Andrew Cheek	16/05/2022	01/06/2022
Patrick Foldenauer	15/05/2022	05/06/2022
Dorian Amaral	16/05/2022	03/06/2022
Sebastian Zell	16/05/2022	21/05/2022
Andrew Svesko	16/05/2022	25/05/2022
Olga Mena	16/05/2022	20/05/2022
Joao Paulo da Mata Araujo	16/05/2022	20/05/2022
Vladimir Kazakov	17/05/2022	21/05/2022
Eduardo Gonzolo Badía	17/05/2022	26/05/2022
Julien Frison	17/05/2020	20/05/2022
Daniel G. Figueroa	18/05/2022	24/05/2022
Rafaelle Savelli	22/05/2022	11/06/2022
Pavel Zhelnin	22/05/2022	27/05/2022
Damian van de Heisteeg	22/05/2022	11/06/2022
Eduardo García Valdecasas	23/05/2022	26/05/2022
Vaios Ziogas	24/05/2022	31/05/2022
Daniele Gagero	25/05/2022	31/05/2022

Marina Cermeño	26/05/2022	27/05/2022
Pedro de la Torre Luque	26/05/2022	27/05/2022
Miquel Ardid	26/05/2022	27/05/2022
Ernesto Lozano	26/05/2022	29/05/2022
Alvaro Herráez	23/05/2022	17/06/2022
Pablo Bueno	30/05/2022	03/06/2022
David Kaplan	01/06/2022	03/06/2022
Yasaman Farzan	05/06/2022	18/06/2022
Antonio Delgado	06/06/2022	10/02/2022
Jacobo López	06/06/2022	17/06/2022
Fernando Arias	06/06/2022	08/06/2022
Chris Hays	08/06/2022	10/06/2022
Georg Weiglein	08/06/2022	10/06/2022
Alessandro Vicini	08/06/2022	09/06/2022
Ken Mimasu	12/06/2022	14/06/2022
Celine Degrande	13/06/2022	14/06/2022
Mattia Cielo	15/06/2022	15/07/2022
Christopher N Pope	16/06/2022	20/06/2022
Menhir Music	17/06/2022	17/06/2022
Lukasz Wyrzykowski	19/06/2022	25/06/2022
Chirsitna Byrnes	20/06/2022	20/06/2022
Arman Shafieloo	20/06/2022	24/06/2022
Cesar Alfonso Agón	20/06/202	23/06/2022
Johanna Linsley	20/06/2022	24/06/2022
Nikolai Husung	22/06/2022	24/06/2022
Thomas Banks	24/06/2022	30/06/2022
Mariá Pilar García del Moral	27/06/2022	26/07/2022
Claudio Bonano	27/06/2022	01/07/2022
Max Wiesner	27/06/2022	01/07/2022

Alejandro Ibarra	27/06/2022	06/07/2022
Diego García Martin	27/06/2022	30/09/2022
Chris Korthals Altes	02/07/2022	05/07/2022
Guido Martinelli	03/07/2022	06/07/2022
Sumit Das	05/07/2022	14/07/2022
Javier Moreno González	07/07/2022	30/09/2022
Antonio Riotto	24/07/2022	29/07/2022
Yashar Akrami	28/08/2022	04/09/2022
Stephen Parke	29/08/2022	30/09/2022
J. Bayron Orjuela-Quintana	30/08/2022	16/11/2022
Yoshiki Kanazawa	01/09/2022	24/09/2022
Sudipto Singha Roy	04/09/2022	11/09/2022
Jenifer Meneses	06/09/2022	23/09/2022
Stefan Sint	07/09/2022	15/11/2022
Javier Martínez Magán	09/09/2022	24/09/2022
Ameek Malhotra	10/09/2022	09/10/2022
Vicente Cortés Suarez	10/09/2022	13/09/2022
Claire Guepin	13/09/2022	17/09/2022
Roberto Emparán	14/09/2022	15/09/2022
Mattia Cielo	15/09/2022	17/10/2022
Takahiro Yamamoto	16/09/2022	16/10/2022
Saso Grozdanov	17/09/2022	21/09/2022
Anamaría Font	20/09/2022	05/10/2022
Sergio Hernández Cadena	20/09/2022	21/10/2022
Severin Bunk	21/09/2022	28/09/2022
Romina Ballesteros	23/09/2022	30/06/2023
Markus Mueller	25/09/2022	03/10/2022
Rodrigo Olea	26/09/2022	30/09/2022
Pepe Gracia	26/09/2022	25/11/2022

Michele Doro	26/09/2022	27/09/2022
Arunima Bhattacharya	26/09/2022	28/11/2022
Pablo Bueno	29/09/2022	29/09/2022
José Manuel Izquierdo	29/09/2022	29/09/2022
Elena Cáseres	01/10/2022	30/10/2022
Koya Murakami	01/10/2022	30/10/2022
Biagio Lucini	02/10/2022	04/10/2022
Theodora Psarra	03/10/2022	20/12/2022
Ryoto Inui	06/10/2022	31/10/2022
Leszek Roszkowski	05/10/2022	09/10/2022
Jacobo López	05/10/2022	11/10/2022
Geraldine Servant	08/10/2022	16/10/2022
Daniel Carlos Cabra	12/10/2022	14/10/2022
Diego Blas	17/10/2022	21/10/2022
Pierre Fleury	22/10/2022	29/10/2022
Łukasz Wyrzykowski	24/10/2022	30/10/2022
Carles Sierra	27/10/2022	27/10/2022
Joaquim Iguaz	24/10/2022	28/10/2022
Eric Bergshoeff	30/10/2022	30/11/2022
Sinyha Kanemura	29/10/2022	05/11/2022
Stefano Rigolín	31/10/2022	04/11/2022
Tatiana Tarutina	02/11/2022	29/11/2022
Jos Vermaseren	02/11/2022	02/12/2022
Alejandro Szynkman	03/11/2022	30/11/2022
Jose Calderon	03/11/2022	04/11/20200ok
Stefan Pokorski	31/10/2022	05/11/2022
Danielle Musso	06/11/2022	13/11/2022

Benjamín Grinstein	08/11/2022	14/12/2022
Andrew Svesko	07/11/2022	12/11/2022
Michele Maggiore	07/11/20222	14/11/2022
Santiago Avila	12/11/2022	19/11/2022
Simons Hands	13/11/2022	18/11/2022
Diego García Martin	14/11/2022	05/01/2023
Mauro Papinutto	16/11/2022	19/11/2022
Francesco Scardino	16/11/2022	19/11/2022
Jacobo López	21/11/2022	25/11/2022
Laura Molina	20/11/2022	23/11/2022
Filippo Sottovia	21/11/2022	02/12/2022
Killian Martineau	21/11/2022	26/11/2022
Daniel González Cuadra	21/11/2022	23/11/2022
Carlos Arguelles	21/11/2022	16/12/2022
Manuela Vecchi	24/11/2022	26/11/2022
Michele Doro	25/11/2022	27/11/2022
Andreas Mantziris	01/12/2022	01/12/2022
Igor Bandos	11/12/2022	21/12/2022
Jihn E. Kim	12/12/2022	19/12/2022
Claudio Bonano	12/12/2022	16/12/2022
María del Pilar García del Moral	14/12/2022	16/12/2022
Jacobo López	19/12/2022	22/12/2022
Dmytro Sorokin	12/09/2022	13/09/2022
Robie Hennigar	12/09/2022	13/09/2022
Pablo Cano	11/09/2022	14/09/2023
Ivanna Batkovic	02/11/2022	06/11/2022

Formación

El IFT lleva a cabo dos programas de formación, en colaboración con el Departamento de Física Teórica (DFT) de la Universidad Autónoma de Madrid (UAM).

En primer lugar, hay un Máster en Física Teórica, con especialización en temas centrales de Física de Partículas y Cosmología, que admite aproximadamente a 20 estudiantes por año. (Hay otro itinerario centrado en Astrofísica). El grado de Máster se ha establecido como referente en España dentro de la Física Fundamental — alrededor de la mitad de los estudiantes provienen de fuera del área de Madrid. Sin embargo, solo alrededor del 10% son mujeres y el 10% proviene del extranjero.

La segunda estructura de formación es el programa de doctorado, también establecido en colaboración con el DFT de la UAM. Más de 60 estudiantes trabajan en un momento dado hacia un doctorado en las instalaciones del IFT, donde se les ofrecen alrededor de 8-10 cursos de doctorado por año, impartidos por personal del IFT o profesores invitados del extranjero. Aproximadamente el 20% de los estudiantes son mujeres y alrededor del 30% son internacionales. El flujo de defensas de tesis es de alrededor de 15 por año, una cifra que ha aumentado constantemente a lo largo de los años, como se observa en el gráfico a continuación.

El programa de doctorado muestra un grado relativamente alto de internacionalización en comparación con el máster. En el gráfico a continuación también podemos ver el flujo histórico de egresados desde la creación del IFT.

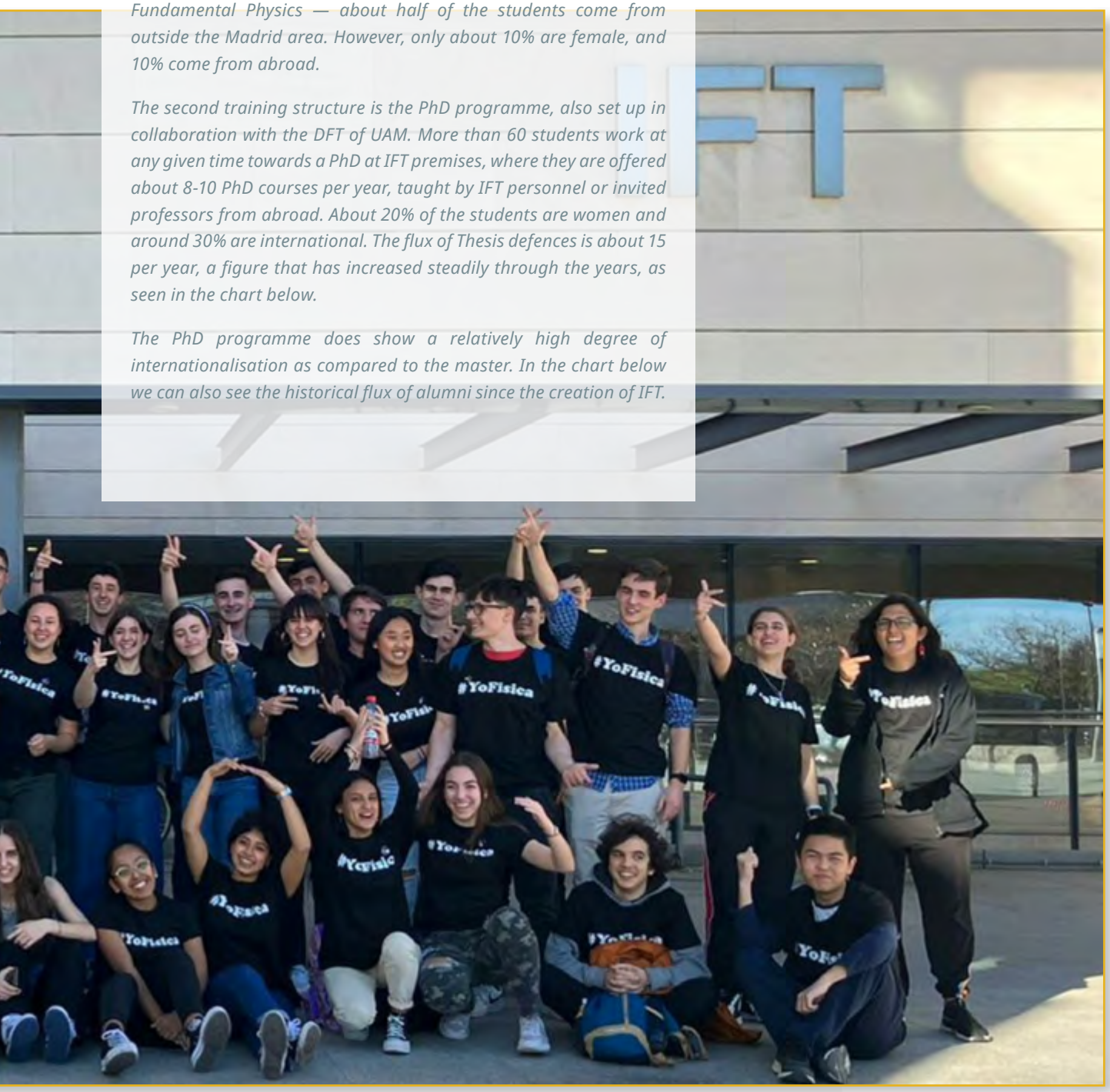
Training

The IFT runs two training programmes, in collaboration with the Department of Theoretical Physics (DFT) of the Universidad Autónoma de Madrid (UAM).

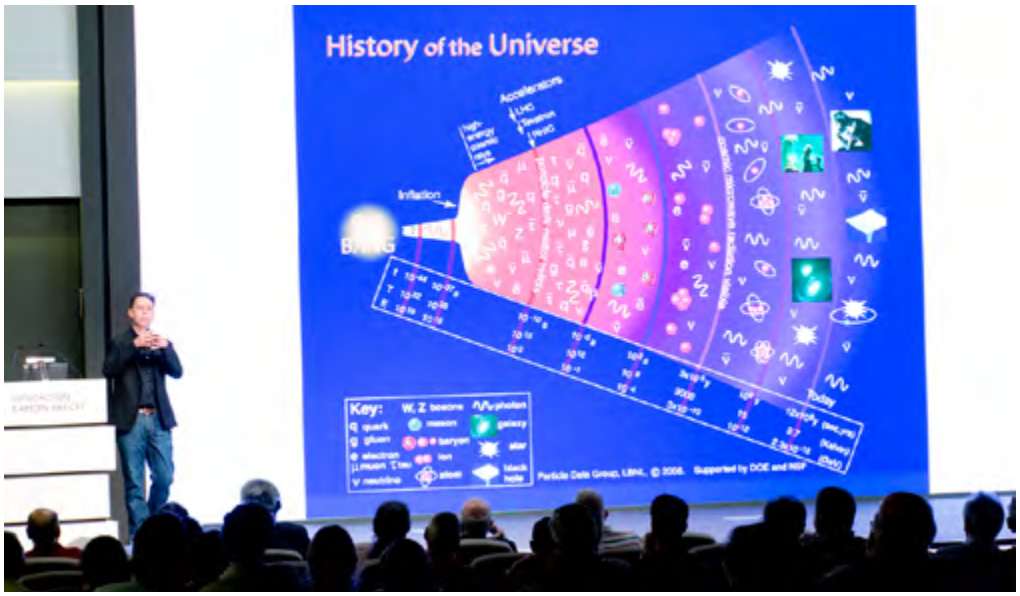
First, there is a Master in Theoretical Physics, with a specialization in core topics of Particle Physics and Cosmology, that takes about 20 students/year. (There is another itinerary focussed on Astrophysics.) The MSc degree has established itself as referential in Spain within Fundamental Physics — about half of the students come from outside the Madrid area. However, only about 10% are female, and 10% come from abroad.

The second training structure is the PhD programme, also set up in collaboration with the DFT of UAM. More than 60 students work at any given time towards a PhD at IFT premises, where they are offered about 8-10 PhD courses per year, taught by IFT personnel or invited professors from abroad. About 20% of the students are women and around 30% are international. The flux of Thesis defences is about 15 per year, a figure that has increased steadily through the years, as seen in the chart below.

The PhD programme does show a relatively high degree of internationalisation as compared to the master. In the chart below we can also see the historical flux of alumni since the creation of IFT.



Divulgación ❍ Outreach



La divulgación de la actividad científica a la población es una tarea de enorme importancia que proporciona a la sociedad beneficios de muy variada naturaleza. Indirectamente esa comunicación aumenta la sensibilidad social hacia el interés y relevancia de la labor investigadora. Es frecuente que los países líderes en investigación y desarrollo sean a su vez aquellos en los que la población valora más el trabajo de sus investigadores. El IFT destaca por una marcada vocación en la transmisión de conocimiento a la sociedad, a través de los medios de comunicación y de diversas actividades de divulgación científica.

The transmission of scientific activity to the population is a task of enormous importance that provides society with benefits of various kinds. Indirectly, this communication increases social sensitivity towards the interest and relevance of research work. It is common for leading countries in research and development to also be those in which the population values the work of their researchers the most. IFT stands out for its marked vocation in transmitting knowledge to society, through the media and various scientific outreach activities.

Canal de YouTube

El canal de YouTube del IFT es la actividad de divulgación insignia del instituto. Cuenta con más de 700.000 seguidores y es un referente en contenido de física en español. Se publican de dos a cuatro vídeos al mes; en ellos, un investigador explica un tema de física fundamental delante de una pizarra o bien comenta un tema de actualidad. A su vez, el canal de YouTube recoge con frecuencia entrevistas a investigadores distinguidos que pasan por sus instalaciones. En ocasiones, también adapta su formato a los directos, para fomentar la interactuación con el público.

El canal de YouTube del IFT acumula unas 7 millones de visualizaciones al año. A lo largo del 2022, el IFT subió 39 vídeos.

Our YouTube channel is the IFT's flagship outreach activity. It has over 705,000 followers and is a reference for Spanish-language physics content. The videos feature a researcher explaining a fundamental physics topic on a blackboard, or commenting on a topic of interest. Meanwhile, the YouTube channel regularly features interviews with renowned researchers. It also usually adapts its format to live shows, encouraging audience interaction.

The IFT channel receives nearly 7 million views per year. 39 videos were uploaded by the IFT in 2022.

Cultube 3.0

La comunicación y divulgación científica y cultural en redes sociales está adquiriendo un carácter cada vez más importante. En estas nueva plataformas destaca la existencia de una amplia comunidad de creadores en Youtube, que realizan una importante labor de divulgación con un gran número de seguidores tanto en España como en Latinoamérica, y con un alto impacto en un público especialmente joven.

Tras el éxito de las ediciones de 2018 y 2019, y tras el parón de actividades culturales por la pandemia, la tercera edición del evento "Cultube" celebrada en marzo de 2022 reunió un elenco de estos reconocidos Youtubers en diversas áreas de creación y divulgación audiovisual para impartir charlas compartiendo sus experiencias en esta plataforma. Los temas abarcan, entre otros, la comunicación y divulgación científica en diversas disciplinas, la Historia, la Lingüística, la Informática, el análisis y crítica musical, la Arquitectura, la Filosofía, y temas de interés social actual, como la salud y la Medicina.

Los organizadores del evento son el Instituto de Física Teórica UAM-CSIC, el canal Youtube de divulgación científica Quantum Fracture y La Casa Encendida. El evento contó con la financiación de la Fundación Española para la Ciencia y la Tecnología (FECYT) y la Fundación General CSIC.

The communication of scientific and cultural information on social media is becoming increasingly important. On these new online platforms, there is a notable presence of a large community of creators on YouTube, who carry out significant dissemination work with a large number of followers both in Spain and Latin America, and with a high impact on a particularly young audience.

Following the success of the 2018 and 2019 editions, and after the pause in cultural activities due to the pandemic, the third edition of the "Cultube" event held in March 2022 brought together a cast of these renowned YouTubers from various areas of audiovisual creation and dissemination to give talks sharing their experiences on this platform. The topics covered include, among others, the communication and dissemination of science in various disciplines, History, Linguistics, Computer Science, music analysis and critique, Architecture, Philosophy, and current social interest topics such as health and Medicine.

The organizers of the event are the Institute for Theoretical Physics UAM-CSIC, the YouTube science dissemination channel Quantum Fracture, and La Casa Encendida. The event was funded by the Fundación Española de Ciencia y Tecnología (FECYT) and the CSIC Foundation.

La Noche Europea de los y las Investigadores/as

European Researcher's Night

El IFT participa activamente en la mayoría de convocatorias de fomento de la divulgación celebradas anualmente, como la Semana de la Ciencia o la Noche de los Investigadores, realizando actividades como charlas, encuentros y juegos con el público general.

Every year, IFT takes part in several events to promote outreach, such as Semana de la Ciencia or European Researchers' Night, by giving talks, hosting meetings, and holding games with general public.

Semana de la Ciencia: el IFT se alía con La Residencia de Estudiantes

Science Week: The IFT collaboration with 'Residencia de Estudiantes'

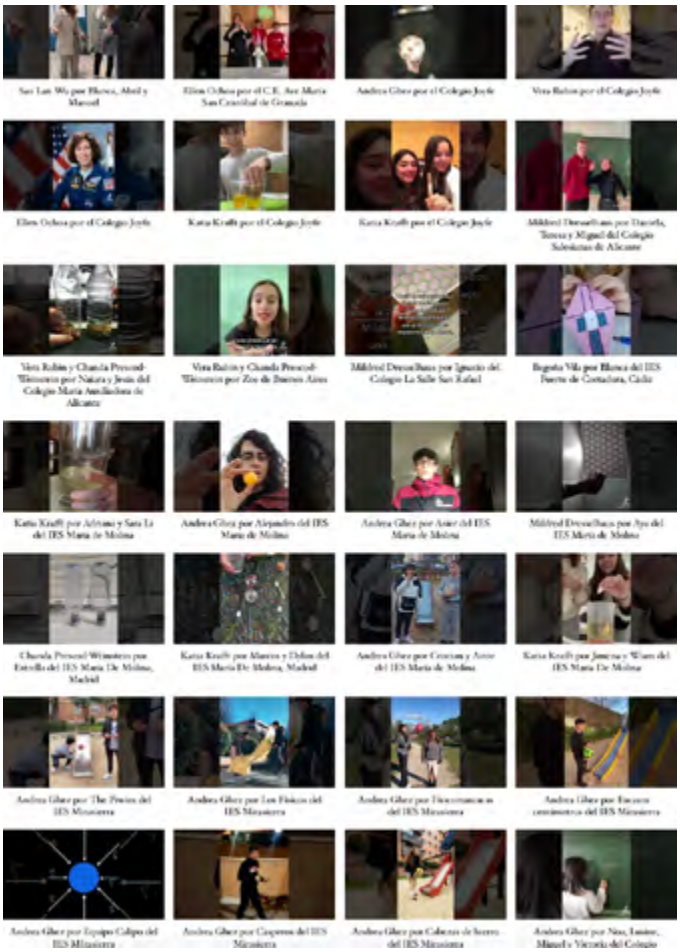
El IFT colabora activamente con la Residencia de Estudiantes y prepara varias conferencias cada año en la célebre colina de los chopos a las que acuden decenas de personas. Las charlas realizadas junto a la Residencia de Estudiantes en 2022 fueron 6, y en cada una de ellas acudió una media de 50 personas.

In cooperation with Residencia de Estudiantes, IFT organizes several conferences each year, which are attended by dozens of people. In 2022, there were six talks held with Residencia de Estudiantes, and an average of 50 people attended each.

#YoFísica

Esta actividad de divulgación, junto con los vídeos del canal de YouTube, es una de las más populares y se enmarca dentro del Día Internacional de la Mujer y la Niña en la Ciencia. Cientos de escolares se apuntan cada año a un reto propuesto por el IFT, que suele consistir en realizar un trabajo (un vídeo, un dibujo, etc.) divertido sobre una científica célebre. En 2022, el IFT propuso #YoFisicaEnTikTok, en el que los alumnos debían enviar un vídeo realizando un experimento ya dado acerca de una física famosa. La edición anterior #YoFisicaEnComic, igualmente exitosa, reunió cientos de dibujos, viñetas y murales contando las aventuras de diversas científicas, propuestas por el IFT.

This outreach activity, along with the videos on the YouTube channel, is one of the most popular outreach iniciative. A challenge proposed by the IFT each year attracts hundreds of students who make a fun piece of work (a video, a drawing, etc.) about a famous scientist. Students were asked to upload videos of themselves performing a famous physics experiment for the IFT's #YoFisicaEnTikTok contest. In this activity, women are encouraged to pursue scientific careers and female references are disseminated. There were 150 videos involving about 400 participants. The previous edition of #YoFisicaEnComic, equally successful, gathered hundreds of drawings, panels, and murals depicting the adventures of various female scientists, proposed by the IFT.



Colaboración con medios de comunicación

Media collaboration

El IFT colabora activamente con el periodismo científico, aparenciendo con frecuencia como fuente en medios de comunicación diversos: generalistas, como Radio Nacional o El Mundo; o especializados, como Muy Interesante o The Conversation.

As a source for scientific journalism, the IFT is frequently featured in a variety of media, including generalists such as Radio Nacional or El Mundo; or specialized media such as Muy Interesante or The Conversation.

'Territorio gravedad'

La docuserie 'Territorio gravedad' fue estrenada en La 2 de Televisión Española en 2022, un producto audiovisual que cuenta con la colaboración del IFT. De hecho, el centro tiene un papel relevante en los episodios 6, 11 y 12.

La 2 de Televisión Española streamed the docuseries "Territorio gravedad," an audiovisual product produced in collaboration with IFT. In episodes 6, 11 and 12, the IFT plays a significant role.

Redes sociales

Social Media

El IFT tiene una presencia importante en el mundo mediático a través de la publicación frecuente en sus redes sociales: Twitter (>28.000 seguidores), Instagram (>6000 seguidores), Facebook (>11.000 seguidores) y TikTok, cuyo perfil se abrió en 2022; además del canal de YouTube y la sección de noticias de la web. En sus redes, el IFT recoge no solo las actividades que realiza, sino que también son una plataforma de divulgación científica por sí mismas.

The IFT has a prominent presence in the media world through its social networks, such as Twitter (>28.000 followers), Instagram (>6000 followers), Facebook (>11.000 followers) and TikTok (since 2022), as well as YouTube and the news sections of its website. As well as collecting its own activities, the IFT's networks serve as an outreach platforms by themselves.

Parámetros para Comprender la Incertidumbre

Parameters for Understanding Uncertainty

El proyecto "Parámetros para Comprender la Incertidumbre: Práctica Creativa y Detección Sónica como Estrategias para la Divulgación Científica (P4UU)" investiga cómo las metodologías utilizadas en la investigación artística se encuentran con las de las ciencias físicas.

La Dra. Rebecca Collins, investigadora principal de este proyecto financiado por la Royal Society of Edinburgh, utiliza métodos innovadores para hacer comprensibles conceptos científicos complejos a audiencias no especializadas. Estos métodos incluyen poner a investigadores artísticos en diálogo con físicos, enfoques somáticos para compartir procesos de investigación y trabajar con compositores para crear arte sonoro que ofrezca formas alternativas de imaginar y acceder al mundo de la materia.

Durante el período 2022-23, la Dra. Collins, profesora de Teoría del Arte Contemporáneo en la Universidad de Edimburgo, fue artista residente en el Instituto de Física Teórica (IFT UAM-CSIC) para llevar a cabo este trabajo.

The project "Parameters for Understanding Uncertainty: Creative Practice and Sonic Detection as Strategies for Scientific Outreach (P4UU)" investigates how methodologies used in artistic research meet those in the physical sciences.

Dr Rebecca Collins, lead investigator of this Royal Society of Edinburgh funded project, uses innovative methods to make complex scientific concepts legible to non-specialist audiences. These methods include putting artistic researchers in dialogue with physicists, somatic approaches to sharing research processes, and working with composers to create sound art to offer alternative ways to imagine and access the world of matter.

For the duration of 2022-23 Dr Collins, lecturer in Contemporary Art Theory at the University of Edinburgh, was artist-in-residence at the Instituto de Física Teórica (IFT UAM-CSIC) to carry out this work.

Parte 1: Incertidumbre e indeterminación

Part 1: Uncertainty and indeterminacy

La primera sesión (11 de marzo de 2022) consideró el papel de la incertidumbre y la indeterminación dentro de la física teórica de partículas y el trabajo de los compositores de música experimental. Si la materia, aunque sea a través del uso de la tecnología, es audible y el silencio (según el compositor experimental John Cage) es sonido, ¿qué podría estar ocurriendo a nivel microscópico o subatómico del Universo? ¿Hay pistas que descubrir en las teorías del mundo cuántico? ¿Qué podría ofrecer el principio de incertidumbre a las artes y humanidades? ¿Qué puede hacer la desmitificación de puntos y eventos fijos por la imaginación? ¿Qué papel juega la intuición en los procesos científicos? ¿Puede una comprensión del mundo cuántico enseñarnos algo sobre la inestabilidad de cómo percibimos, clasificamos e interpretamos nuestra realidad presente?

La sesión tuvo lugar el viernes 11 de marzo de 2022. La documentación en video (en español) está disponible en YouTube.

Artes y Humanidades: Carmen Pardo Salgado trabaja en la interfaz entre la filosofía y el arte sonoro. Es profesora titular en la Universidad de Girona y profesora del Máster en Arte Sonoro en la Universidad de Barcelona.

Física: Esperanza López-Manzanares tiene un doctorado en Física por la Universidad Autónoma de Madrid (UAM). Actualmente es Investigadora Científica en el CSIC, en el Instituto de Física Teórica, donde es especialista en el principio holográfico de las teorías de supercuerdas dentro de las teorías de gravedad cuántica.

The first session (March 11 2022) considered the role of uncertainty and indeterminacy within theoretical particle physics and the work of experimental music composers. If matter, albeit through the use of technology, is audible and silence (after experimental composer John Cage) is sound what might be going on at the microscopic or subatomic level of the Universe? Are there clues to be uncovered in theories of the quantum world? What might the uncertainty principle offer arts and humanities? What can the debunking of fixed points and events do for the imagination? What role does intuition play in scientific processes? Can an understanding of the quantum world teach us something of the instability of how we perceive, classify and interpret our present reality?

Arts: Carmen Pardo Salgado works in the interface between philosophy and sound art. She is a tenured lecturer at the University of Girona and Professor of the Sound Art Master's degree at the University of Barcelona.

Physicist: Esperanza López-Manzanares holds a PhD in Physics from the Autonomous University of Madrid (UAM). She is currently a Scientific Researcher at the CSIC, at the Institute of Theoretical Physics where she is a specialist in the holographic principle of superstring theories within the theories of quantum gravity.

Parte 2: Membranas, Micrófonos, Hidrófonos y Partículas

Part 2: Membranes, Microphones, Hydrophones & Particles

La segunda sesión (27 de mayo de 2022) consideró el uso de la tecnología acústica dentro de la física teórica de partículas y los usos creativos/culturales de la radio. Actualmente, experimentos interdisciplinarios europeos utilizan tecnología en el fondo marino para detectar partículas microscópicas. Donde alguna vez (quizás ingenuamente) pensamos en la profundidad del océano como un espacio homogéneo y unificado, los datos de tales experimentos nos enseñan lo contrario. El acceso remoto continuo a áreas submarinas proporciona conocimientos útiles (y cruciales) sobre una multitud de fenómenos sonoros. Junto a los conocimientos sobre el comportamiento de partículas de alta energía, estos experimentos también proporcionan datos sobre perfiles de ruido submarino y las actividades acústicas de los cetáceos. ¿Cuáles son las condiciones adecuadas para detectar los elementos microscópicos e invisibles de nuestro universo? ¿Qué podría ofrecer a la imaginación la capacidad de navegar las intensidades y densidades del subacuático, inaccesibles en nuestra vida cotidiana? ¿Cómo podrían estas formas de experimentación científica informar el pensamiento actual en las artes y humanidades?

Artes: Miguel Álvarez-Fernández es un artista sonoro, musicólogo, escritor, productor de radio y cineasta. Desde 2008, es el presentador de 'Ars Sonora', un programa semanal que se transmite en Radio Clásica de Radio Nacional de España.

Física: Miquel Ardid es investigador en el Campus de Gandía de la Universidad Politécnica de Valencia, donde lidera el grupo de detección de física de partículas astrofísicas acústicas.

The second session (27 May 2022) considered the use of acoustic technology within theoretical particle physics and creative/cultural uses of radio. European interdisciplinary experiments currently make use of technology in the deep sea to detect microscopic particles. Where we might once have (perhaps naively) thought of the depth of the ocean as a homogeneous, unified space, data from such experiments teaches us otherwise. Ongoing remote access to underwater areas provides useful (and crucial) insights into a plethora of sonic phenomena. Alongside insights into the behaviours of high-energy particles such experiments also provide accounts of underwater noise profiles and the acoustic activities of cetaceans. What are the adequate conditions within which to detect the microscopic and invisible elements of our universe? What might the ability to navigate the intensities and densities of the subaquatic, otherwise inaccessible in our everyday lives, offer to aesthetic thought/ to the imagination? How might these forms of scientific experimentation inform current thinking within the arts and humanities?

Arts: Miguel Álvarez-Fernández is a sound artist, musicologist, writer, radio producer and film maker. Since 2008 he is the presenter of 'Ars Sonora' a weekly programme that airs on Classical Spanish National Radio.

Physicist: Miquel Ardid is a researcher at the Gandía Campus of the Polytechnical University in Valencia where he leads the detection of acoustic astro particle physics group.

El artista Miguel Álvarez-Fernández, el investigador David G. Cerdeño, el investigador Miquel Ardid, y la artista e investigadora Rebecca Collins

Parte 3: Metodologías para descubrir lo desconocido

Part 3: Methodologies for Discovering the Unknown

La tercera sesión (30 de septiembre de 2022) de la serie se centró en el papel del proceso dentro de la investigación artística y la experimentación científica. La búsqueda de lo desconocido, tanto en el contexto de la física de partículas como en la investigación artística, requiere infraestructura, imaginación y experimentación. La verificación y reproducibilidad de los resultados es un aspecto crucial de la experimentación científica, sin embargo, tales metodologías a menudo traen retornos más lentos y menos recompensas que otras búsquedas dedicadas a descubrir lo desconocido. Igualmente, las residencias artísticas y su configuración dentro del contexto de instituciones interdisciplinarias implican riesgo, determinación e incertidumbre. Tales cualidades a menudo se pasan por alto en favor de resultados, datos, productos o metas temporales. Aunque, con el tiempo, estos puedan lograrse, ¿podemos reconsiderar el valor de las metodologías dedicadas a descubrir lo desconocido?

Las areas de discusión incluyeron: ¿En qué medida es la práctica artística una forma de conocimiento? ¿Qué tipo de intervención ofrecen las residencias artísticas cuando se sitúan dentro de instituciones? ¿Pueden reproducirse tales estructuras? ¿Cuál es el papel del arte y la cultura en relación con la ciencia y la tecnología? En el contexto de la experimentación científica, ¿en qué medida deberían ser reproducibles los resultados? ¿Qué papel podría jugar el fracaso en relación con la comprensión de lo desconocido?

Artes y Humanidades: Ariane Koek es una productora, curadora y escritora independiente reconocida internacionalmente por su trabajo transdisciplinario en las artes, la ciencia y la tecnología, y en la creación de nuevos programas de residencias.

Física: Marisa Sarsa Sarsa es profesora de física atómica, molecular y nuclear en el Departamento de Física Teórica de la Universidad de Zaragoza. Es la Investigadora Principal del experimento ANAIS en el Laboratorio Subterráneo de Canfranc.

The third session (September 30 2022) in the series focused on the role of process within artistic research and scientific experimentation. The pursuit of the unknown, both within the context of particle physics and artistic research, requires infrastructure, imagination, and experimentation. The verification and reproducibility of results is a crucial aspect of scientific experimentation, yet such methodologies often bring slower returns and less reward than other searches dedicated to uncovering the unknown. Equally, artistic residencies and their set up within the context of interdisciplinary institutions involve risk, determination and uncertainty. Such qualities are often overlooked in favour of outcomes, data, products, or timed goals. Whilst, in time these might be achieved, can we reconsider the value of methodologies dedicated to uncovering the unknown?

Areas under discussion included: To what extent is artistic practice a way of knowing? What kind of intervention do artistic residencies offer when situated within institutions? Can such structures be reproduced? What is the role of art and culture in relation to science and technology? In the context of scientific experimentation to what extent should results be reproducible? What role might failure play in relation to figuring out the unknown?

Arts: Ariane Koek is an independent producer, curator, and writer recognised internationally for her transdisciplinary work in the arts, science, and technology, and in the creation of new residency programmes.

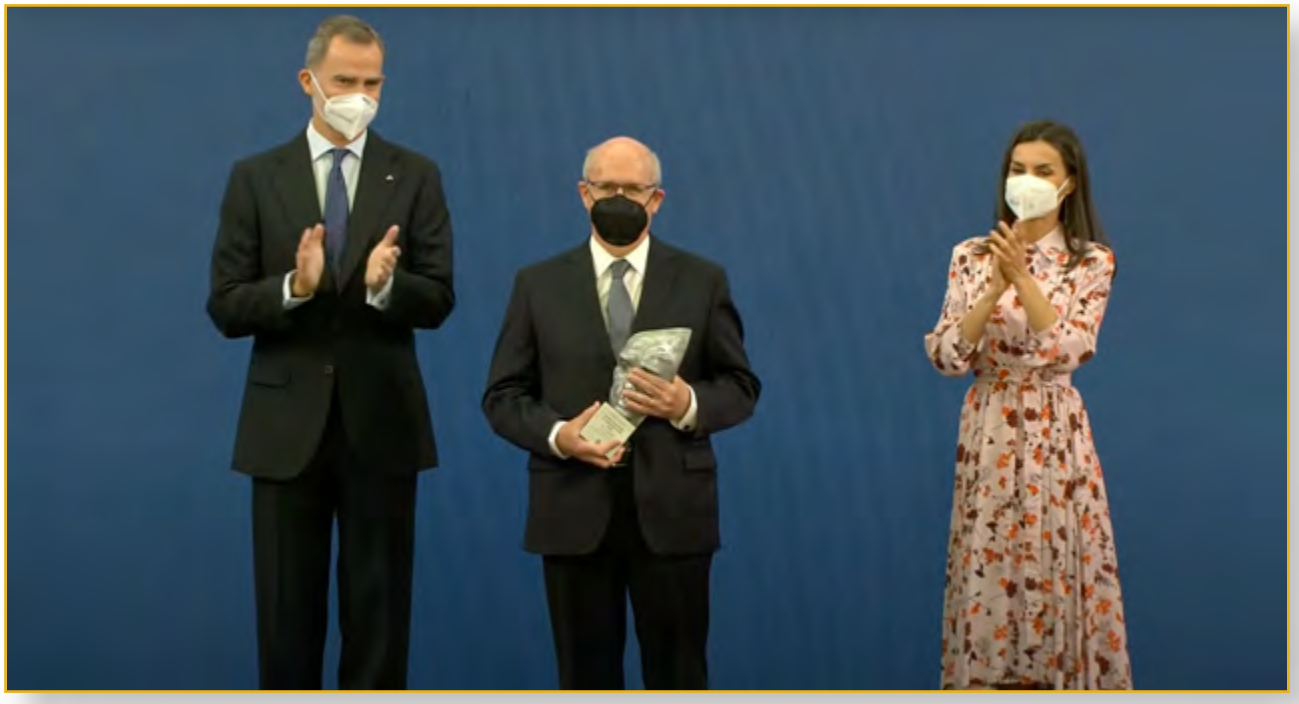
Physicist: Marisa Sarsa Sarsa is Professor of atomic, molecular, and nuclear physics at the Department of Theoretical Physics at the University of Zaragoza. She is the Principal Investigator of the ANAIS experiment at the Canfranc Underground Laboratory.

La artista e investigadora Rebecca Collins, la artista Ariane Koek, la investigadora María Luisa Sarsa, el investigador David G. Cerdeño.

Hitos 2021-2022 ❍ Highlights 2021-2022

Luis E. Ibáñez, Premio Nacional de Investigación

Luis E. Ibáñez, 2020 National Research Prize



Luis E. Ibañez, (director del IFT durante el período de octubre de 2018 a octubre de 2021) recibió el Premio Nacional de Investigación "Blas Cabrera" 2020 de manos de Sus Majestades los Reyes de España. La ceremonia tuvo lugar el lunes 17 de mayo de 2021.

Luis E. Ibañez, (IFT director during the period october 2018 to october 2021) received the 2020 National Research Prize "Blas Cabrera" from the hands of Their Majesties the King and Queen of Spain. The ceremony took place on Monday 17 of May, 2021.

Marienza Caldarola recibe el Premio Nacional Milla Baldo Ceolin 2021 para Mujeres en Física Teórica

Marienza Caldarola recieves the Milla Baldo Ceolin 2021 National Prize for Women in Theoretical Physics

El premio se otorga anualmente a la mejor tesis presentada por investigadores que trabajan en física teórica, establecido por el INFN (Instituto Nacional de Física Nuclear) y conferido por el Instituto Galileo Galilei (GGI), el Centro Nacional del INFN dedicado a la formación avanzada en física teórica.

The prize is awarded annually to the best master's thesis submitted by researchers working in theoretical physics, established by INFN (National Institute of Nuclear Physics) and conferred by the GGI Galileo Galilei Institute, the INFN National Center dedicated to advanced training in theoretical physics.

Medalla de la Academia Joven de España 2022, otorgada a Irene Valenzuela (CERN & IFT)

Medal of the Spanish Young Academy 2022, awarded to Irene Valenzuela (CERN & IFT)

Irene Valenzuela es una joven líder en el campo de la teoría de cuerdas. Obtuvo su doctorado en el IFT en la UAM en 2015, y continuó su carrera en varios posdoctorados en instituciones de primer nivel mundial, como el Instituto Max Planck en Múnich, la Universidad de Utrecht, la Universidad de Cornell y la Universidad de Harvard, y recientemente se unió al IFT como Investigadora Ramón y Cajal en el IFT.

También recibió el **Premio Investigador Joven en Física 2021** de la Fundación BBVA y la Real Sociedad Española de Física. La gravedad cuántica, la teoría de cuerdas y sus implicaciones para la física de partículas y la cosmología son el foco de su investigación.

Irene Valenzuela is a young leader in the field of string theory. She obtained the PhD at the IFT in UAM in 2015, and continued her career in several postdocs at world-wide top institutions, such as the Max Planck Institute in Munich, Utrecht University, Cornell University and Harvard University, and recently joined the IFT as Ramón y Cajal Fellow at the IFT.

*She also received the **2021 Young Researcher Prize in Physics** of the BBVA Foundation and the Spanish Physics Royal Society. Quantum gravity, string theory, and their implications for particle physics and cosmology are the focus of her research.*

La Medalla Real 2022 de la Sociedad Española de Física - Fundación BBVA, otorgada a Álvaro de Rújula

The 2022 Royal Medal of the Spanish Society of Physics - BBVA Foundation was awarded to Álvaro de Rújula

El investigador del IFT/CERN Álvaro de Rújula ha sido galardonado con la Medalla de la Real Sociedad Española de Física por "su excepcional carrera científica en el campo de la física teórica, que lo ha convertido en un líder mundial en física de partículas elementales, cromodinámica cuántica y cosmología". Sus trabajos han impactado numerosos campos de la física, contribuyendo fundamentalmente a la comprensión de la materia, la energía y nuestro universo. Además, el jurado ha destacado "su relevante contribución a la divulgación de la física y a acercar sus resultados a la sociedad".

IFT/CERN researcher Álvaro de Rújula has been awarded with the Medal of the Royal Spanish Society of Physics for "his exceptional scientific career in the field of theoretical physics, which has made him a world leader in elementary particle physics, quantum chromodynamics and cosmology". His works have impacted numerous fields of physics, contributing fundamentally to the understanding of matter, energy and our universe. In addition, the jury has highlighted "his relevant contribution to the outreach of physics and to bring its results closer to society".

Juan García-Bellido, nombrado Académico de la Real Academia de Ciencias

Juan García-Bellido, named Academician of the Royal Academy of Sciences

Juan García-Bellido es catedrático en Física Teórica por la Universidad Autónoma de Madrid. Su trabajo de investigación se desarrolla en el contexto de la Cosmología Teórica, tanto del Universo primitivo como de su evolución actual, centrándose en la Física de Partículas, la Inflación Cosmológica, el Fondo de Radiación Cósmica, las Ondas Gravitacionales, la Energía y Materia Oscuras. Sus trabajos teóricos sobre la existencia y características de unos posibles agujeros negros primigenios, sobre la generación de ondas gravitatorias a partir de ellos, y sobre multiples temas cosmológicos son internacionalmente reconocidos.

Obtuvo el reconocimiento por sus contribuciones y trabajo teórico en cosmología y astrofísica.

Juan García-Bellido is a professor in Theoretical Physics from the Universidad Autónoma de Madrid. His research work is developed in the context of Theoretical Cosmology, focusing on both the early Universe and its current evolution, with an emphasis on Particle Physics, Cosmological Inflation, the Cosmic Microwave Background, Gravitational Waves, and Dark Energy and Matter. His theoretical work on the existence and characteristics of possible primordial black holes, the generation of gravitational waves from them, and various cosmological topics is internationally recognized.

He obtained the acknowledgement for his contributions and theoretical work in cosmology and astrophysics.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