

IFT Newsletter # 1

From October to December 2013

In this Newsletter: New arrivals, new students, new visitors, postdoc ad, master course, new call for program proposals and more.

What's all this?

We have a newsletter! As the many news contained here show, it is clear we have a fantastically active institute and much to look forward to.

To suggest information for the next issue and help to correct errors and omissions, please send an email to comunicacion.ift@uam.es

You can find the Newsletter in the [IFT website](#).

The editors Ángel Uranga, Chabely Prats, Francisco Prada and Susana Hernández.

Want to host an IFT Program in 2014-15?

The IFT hosts several Programs in Particle Physics, Astroparticles and Cosmology. Each Program typically lasts up to four weeks and focuses on topics of timely interest in the field, with a distribution of seminars and discussion sessions determined by the organizers. This activity is funded by the Severo Ochoa Excellence Award, which covers travel and local expenses for organizers and key participants, and partial financial support for a number of additional researchers and students.

There is a Open Call to submit Program proposals for the academic year 2014-15. Proposal can be submitted by researchers from any institution, as long as the organizing committee includes one IFT staff member. For instructions click [here](#).

In addition, you are all invited to suggest ideas for productive schools, journal clubs and other activities at the IFT.

Postdocs Opportunities @IFT

The IFT is offering a substantial number of postdoc positions starting in Fall 2014. These include positions under general profile programs, like the *Severo Ochoa Excellence Grant*, and other

government-funded positions. In addition, there are a number of postdoc positions associated to the ERC-SPLE grant (on topics of string phenomenology) and the ERC-SELF-COMPLETION grant (on topics of quantum black holes).

For application to these positions, please follow the instructions [here](#).

Workshops, Schools, and other scientific activities

To see the details about the Seminars and the Journal Club's program (Dark Matter Club, Astro-Ph Cosmology Club, and Gravity & Strings Club) please click [here](#).

Workshops: II Postgraduate Meeting on Theoretical Physics (October 9th to 11th)

Astroparticles Physics and Cosmology 2013 (October 21st to 25th)

9th MultiDark Consolider Workshop (November 6th to 8th)

XIX IFT-UAM/CSIC Christmas Workshop/Symposium (December 11th to 13th)

Schools: Cosmology tools (November 12th to 15th)

Colloquium: Waiting for Higgs by Chris Llewellyn-Smith (October 3rd)

Program: Fundamental Physics in the light of Planck and the Dark Energy Survey. (October 7th to November 1st)

Computing Endowment

The present year the IFT has improved its HPC resources by means of an important extension of its main system, the HPC cluster HYDRA. This extension almost duplicates its theoretical peak performance.

After this update, the IFT is now planning a new extension of HYDRA, with funds of the *Severo Ochoa Award*. The new update is expected by end of 2013.

Related with the computational environment of the IFT, the international HPC company **BULL** has sponsored a main event organized by the IFT: the ["International Workshop on Cosmological Simulations: From Galaxies to Clusters to the Large Scale Structures."](#) and it is also willing to sponsor the upcoming ["School on Cosmology tools"](#) organized by the IFT in November.

IFT Free Coffee!

Since last September the IFT Coffee has come back with the usual free coffee, tea, recent baked cookies & interesting discussion about physics. Normally you can enjoy it after the regular seminar on Mondays, i.e., 16:15h and also at 11:00h on Fridays at the Common Room 3rd floor.

For all those who are interested in collaborating with the organization and cleaning of the IFT coffee, please fill the list which is behind the common room door.

This is a great occasion to meet the speaker of the day and other IFT visitors as well as to engage with each other.

Grants and Awards

Congratulations to **Prof. César Gómez** who was awarded in September with an Advanced Grant of the European Research Council (ERC) for a project led together with Prof. Georgi Davli at LMU in Munich.

The UV-completion through Bose-Einstein Condensation: A Quantum Model of Black Holes (SELFCOMPLETION).

The project is devoted to two of the most fundamental questions in gravity: 1) Understanding the microscopic completion of gravity at very high energies (equivalently at short distances), and 2) understanding quantum physics of large black holes. Recently they have put forward a new proposal that gives a unified approach for addressing these two seemingly disconnected problems. The main idea can be formulated as the black hole "macro-quantumness". This is the key for both understanding black holes properties as well as their role in completion of gravity.

Congratulations also to **Dr. Chia-Hsun Chuang** (*MultiDark* Fellow) who has received in October an award of 200.000 core-hours on the CURIE supercomputer (GENCI@CEA, France) from PRACE (Partnership for Advanced Computing in Europe) (<http://www.prace-ri.eu/>). This CPU time will be used for BOSS clustering studies (www.sdss3.org)

New arrivals

Severo Ochoa Postdoctoral fellows:

1. **Jong Soo Kim** has just finished his postdoc position in Adelaide, Australia. He received his PhD in 2004 in Supersymmetry Phenomenology and model building from the University of Bonn. His main research interest is the collider phenomenology of BSM physics at the LHC.
2. **Yan Liu** finished his PhD in 2010 on string phenomenology and three-dimensional gravity at the Institute of Theoretical Physics, Chinese Academy of Science and his first three-year postdoc

focusing on AdS/CMT in Jan Zaanen and Koenraad Schalm's group at Lorentz Institute, Leiden University. He is interested in gauge/gravity duality and its applications, especially AdS/CMT; three dimensional gravity and AdS3/CFT2, massive gravities and black hole physics.

3. **Ya-Wen Sun** is joining us after completing her postdoc at Leiden University. She received her PhD in 2010 from the Institute of Theoretical Physics, Chinese Academy of Science on gravity theory and black hole physics. Her current research interest is AdS/CFT correspondence and its applications to AdS/CMT; Fluid/gravity duality.
4. **Marco Panero** finished his postdoctoral position at the University of Helsinki. His main research interests are lattice field theory, the large-N limit, and QCD at finite temperature. He finished his PhD in 2003 on confining mechanisms and string effects in lattice gauge theories.
5. **Fabio Iocco** finished his postdoctoral positions at the Oskar Klein Center in Stockholm. His recent research interests are on phenomenology of Dark Matter, and nucleosynthesis in diverse astrophysical environments (e.g. annihilating DM and its effects on CMB, DM and stars, nucleosynthesis in BH accretion...). He received his PhD in 2007 from the University of Napoli "Federico II"

Other Postdoctoral Fellows:

1. **Hiroataka Hayashi** finished his Ph.D. at the University of Tokyo and spent two years as a research fellow at Korea Institute for Advanced Study. He is interested in string theory, in particular string compactifications and their applications to phenomenology as well as supersymmetric gauge theories. His research at IFT is covered by the project PCIG10-GA-2011-304023, Flavor, Unification and Symmetries from Strings.
2. **Paolo Benincasa** completed his PhD on the hydrodynamics of strongly coupled gauge theories at the University of Western Ontario and Perimeter Institute, with Alex Buchel as his advisor. He held a postdoc position at the University of Durham and the Juan de la Cierva fellowship at the University of Santiago de Compostela. His main research interests focus on the investigation of the phase diagram for gauge theories in the strongly coupled regime via holography, and the exploration of the perturbative structure in field theories through the analysis of scattering amplitudes. His research at IFT is covered by the project FPA2012-32828.
3. **Mateusz Koren** has just obtained his PhD on Eguchi-Kawai reduction at the Jagiellonian University, Krakow. He is interested in lattice QCD, both standard and large-N, and computational methods in physics. His research at IFT is covered by the project FPA2012-31686 Dinámica de acoplo fuerte en la frontera de la Física de Partículas.
4. **Cedric Weiland** has completed his PhD at the Laboratoire de Physique Théorique d'Orsay. He is focused on theoretical high-energy physics, especially the neutrino sector and the interplay between low and high-energy observables. He is considering lepton flavour and lepton universality violating observables but also collider signals in the Standard Model and its various

extensions, from sterile neutrinos to supersymmetry and extra-dimensions. He would like to complement this approach by studying the astrophysical and cosmological consequences of these models. His research at IFT is covered by the Project FPA2012-31880 Física de Partículas Elementales.

5. **Pedro Machado** finished his PhD at the University of São Paulo. He is interested in particle phenomenology and model building, particularly neutrino, dark matter and Higgs physics. His research at IFT is covered by the European ITN project FP7-PEOPLE-2011-ITN, PITN-GA-2011-289442-INVISIBLES.

Severo Ochoa Pre-doctoral fellows:

1. **Emilia da Silva** is interested in String Theory and Quantum Field Theory, in particular in Gauge/Gravity dualities. Applications extend from Condensed Matter Physics to High Energy Physics.
2. **Mario Herrero** is interested in quantum field theories on curved space-time and quantum gravity, with special attention to modified theories of gravity and Lorentz violating models of quantum gravity. He is also interested in string theories and the potential applications of holography and the AdS/CFT correspondence.

Campus de Excelencia Pre-doctoral fellows:

1. **Dagoberto Escobar** is a master student. He is interested in topics related to String Theory, Quantum Field Theory and Quantum Gravity.
2. **Sergio Rodríguez** is a PhD student. Since he started studying physics in Colombia, Sergio has focused his work on general relativity and astrophysics. He obtained his master degree at the University Paris-Diderot in fundamental physics with a special interest in cosmology and in computational cosmology. At the moment, in the IFT, he is working with the BOSS data and the big Multidark simulation, specializing his research in the study of the large scale structure in the universe.
3. **Franco Albareti** has finished his Degree in Physics at the Universidad Complutense de Madrid and he is currently studying the Master in Theoretical Physics at the Universidad Autónoma de Madrid. He is interested in Cosmology, General Relativity, Modified Gravity Theories and Classical/Quantum Field Theory in curved spacetimes.

Master Student Scholarships:

1. **Sergio González** is interested in gravitation and cosmology, with special attention to general relativity and quantum field theories in curved spaces.

2. **Rocío Sáez** is interested in topics related to Quantum Mechanics, Quantum Electrodynamics, Gauge theories or Cosmology. In general, she is enthusiastic about Quantum field theory but she is also curious about Quantum information theory.
3. **Ana Isabel Junco** is interested in cosmology. In particular, in topics such as the early universe, inflation, non-gaussianities, the understanding of quantum gravity, and the nature of dark matter and dark energy.
4. **Víctor Díaz** finished his Degree at the Universidad Central de Venezuela, and the Diploma program in High Energy Physics at the ICTP. He is highly interested on problems in the research areas of string theory, Quantum Field Theory and the AdS/ CFT correspondence. His current thinking is to pursue research on string phenomenology, such as moduli stabilization in string compactifications (Type IIB and heterotic), and try to build supersymmetric models to reproduce the Minimal Supersymmetric Standard Model (MSSM). Also, the mathematical structure of the string theory is really appealing to him, and to study in more detail subjects like mirror symmetry on Calabi-Yau manifolds and heterotic string compactifications in more general spaces would be great topics to deal he said.

New Roles

Carlos Muñoz has taken on the role of Director of the Center for Theoretical Physics and Mathematics (CFTMAT) since July 4th.

Long-term Visitors

1. **Gerardo Martínez**, from the Instituto de Física – UFRGS, Federal University of Rio Grande do Sul in Brasil, has been invited to the IFT by Prof. Germán Sierra for a period of six months from October 2013 to March 2014. The subject of his research will be related to quantum spin chains, fractional quantum Hall effect, Bose-Einstein condensates and Anderson localization and Condensed Matter Theory.
2. **George Zoupanos** is visiting the IFT for the month of October. He works in the NTU Athens in Greece. His research interests are unified theories in four and higher dimensions, finite unification, fuzzy extra dimensions and reduction of couplings.
3. **Francesco Caporale** from the University of Calabria, is visiting the IFT from September 3rd to December 1st. He is interested in generalized non-forward BFKL equation; gluon reggeization in the next-to-leading approximation; study of physical cross section in NLO BFKL and collinear improvement of the BFKL kernel.
4. **Beatrice Murdaca** from Physic Department, University of Calabria, visited the IFT last September from 2nd to 29th. She is interested in generalized non-forward BFKL equation, study

of physical cross section in NLO BFKL, collinear improvement of the BFKL kernel and Lipatov's high-energy effective action.

5. **Iñaki García-Etxebarria** will visit the IFT from November 3rd to 30th. He works in the Max-Planck-Institute for Physics on string theory, in particular on its applications to realistic model building and the formal study of field theory. Some of his recent interests on the model building side include global model building in F-theory and in IIB compactifications with branes at singularities, and the study of perturbative and non-perturbative corrections to classical actions coming from string compactifications. On the field theory side he is interested in the study of non-trivial field theory dualities arising from string constructions.
6. **Sebastián Montes** from the Perimeter Institute for Theoretical Physics, is visiting the IFT from October 28th, 2013 to April 30th, 2014. His current research interests are collective quantum phenomena, topological phases of matter; tensor networks states, and renormalization group methods.

Short-term Visitors

1. **Csaba Balazs** from Monash University, Melbourne, visited the IFT in September from 9th to 22nd. His research interests are Higgs boson, Supersymmetry, Grand unification, Extra dimensions, Dark matter, Baryogenesis.
2. **Kristan Jensen** from C.N. Yang Institute for Theoretical Physics visits the Institute from November 9th to 13th. His research interests primarily center around the use of non-perturbative techniques to study quantum field theories. Sometimes that involves the use of (anomalous) symmetries, other times embedding a theory into the low-energy limit of some string theory, or otherwise. These days he is thinking about (i.) the physical consequences of quantum anomalies across physics, from the Standard Model to condensed matter systems and topologically non-trivial phases, (ii.) seeming paradoxes involving entanglement and unitarity in the context of black holes (i.e. black hole information and the "firewalls" controversy), and (iii.) defects in field theory, including defect-localized anomalies and a potential higher-dimensional g-theorem(s).
3. **Nicoló Piazzalunga** from SISSA, is a PhD student in Mathematical Physics. He will be staying at IFT from October 29th to November 7th. He is interested in string phenomenology, and more formal aspects of string theory, particularly Gromov-Witten invariants and their interaction with algebraic geometry; his research project at IFT involves the study, under the supervision of Ángel Uranga, of topological couplings in string theory compactifications.
4. **Pablo Soler** from IAS Hong Kong University of Science and Technology is visiting the IFT for the period November 4 to 22, 2013. His research interests are focus on string theory, both it's formal properties and it's applications to particle physics. In particular. He is interested in non-

perturbative aspects of string theory, ranging from their formal formulations in string field theories, to the phenomenological applications of D-brane instantons in model building.

New (and soon to be) Alumni

1. **Rodrigo Alonso** has moved to the United States at the Physics Department in the University of California at San Diego (UCSD)
2. **Alicia Bueno** has moved to the University of Heidelberg, Germany.
3. **Miguel Zumalacárregui** has moved to the University of Heidelberg in Germany.
4. **Francisco Peña** has moved to Crete Center for Theoretical Physics to the Department of Physics, University of Crete in Greece.
5. **Clara Salas** has moved to Hamburg University in Germany.
6. **José Daniel Madrigal** has moved to the Institut de Physique Théorique CEA-Saclay in France.
7. **Carlos Shahbazi** has moved to the Institut de Physique Théorique CEA-Saclay in France.
8. **Bryan Zaldivar** will start next November at Physics Department at ULB in Belgium.

Congratulations to you all and please do stay in touch!

Outreach

- *IFT at the CSIC Science & Technology Week 2013*

As part of its outreach programme, the IFT is organizing the conference series for the general public "The frontier of Fundamental Physics", within the framework of the CSIC Science & Technology Week 2013, in November 7-22. In a series of 12 conferences, the IFT members will explain their research and results in Particle Physics and Cosmology. Among others, the topics include the Higgs particle and the LHC, dark matter and dark energy, and string theory and black holes. The conferences will take place at the CSIC "Residencia de Estudiantes", in downtown Madrid, a particularly inspiring venue given its established involvement in promoting culture and science.

Links:

<http://workshops.ift.uam-csic.es/iftw.php/ws/151/home>

<http://www.residencia.csic.es/>

<http://www.csic.es/web/guest/semana-de-la-ciencia>

The IFT in the media

In this section you can find the news related to the IFT and its researchers.

1. [Los Centros de Excelencia Severo Ochoa se unen en una alianza para el fomento de la investigación.](#)
2. [Álvaro de Rújula en El País. Lo que nos faltaba: el bosón de Higgs.](#)
3. [¿Por qué el higgs pesa 126 GeV?](#)
4. [Carlos Muñoz en El País: "Partícula Rajoy y partícula Zapatero"](#)
5. [EU COST Action 'The string theory universe'](#)
6. [Dark Energy Survey begins five-year mission to map southern sky in tremendous detail](#)

More News

Please, follow this [link](#) to see more news.

Disclaimer

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