

Doctoral INPhINIT - INCOMING Fellowship Programme 2021 Call for applications

Position: Studies in gauge/gravity duality

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Centre description

The Galician Institute of High Energy Physics (Instituto Galego de Física de Altas Enerxías, IGFAE) is a joint research institute of the University of Santiago de Compostela and Xunta de Galicia (the Galician Autonomous Government). It was officially created on July 2nd 1999. The main goal of the Institute is to coordinate and foster the scientific and technical research in the field of High Energy Physics, Particle and Nuclear Physics and related areas as Astrophysics, Medical Physics and Instrumentation. Of primary importance is the planning and promotion of the relation with large experimental facilities, especially with CERN, GSI/FAIR, the Pierre Auger Observatory and LIGO at present.

The experimental groups at IGFAE coordinate the Spanish participation in the LHCb Collaboration at CERN (being the third group in size in the Collaboration), in the Pierre Auger Observatory, and in the GSI/FAIR nuclear facility. Members of the Institute have relevant participation in the LHCb upgrade planning and the HL-LHC activities. Besides, they are involved in the design of future facilities like in the EIC and FCC physics cases, the LHeC project development and planning, etc. In the last years, a new line has also been opened with the building of a new facility (L2A2) at the University of Santiago de Compostela aiming to produce radioisotopes for medical use by a laser-induced plasma accelerator. Moreover, the theory section of the Institute, with groups working on QCD, string theory and, more recently, on BSM, holds an excellent international reputation, with participation in many international committees, invitations to plenary talks in top conferences and large-impact publications. The institute holds two ERC grantees, one StG and one StG+AdG.



Research project and research line description

The string theory group at IGFAE is currently carrying ongoing studies in several branches of the gauge-gravity duality, also known as AdS/CFT correspondence. Our group is willing to accept a predoctoral student that will perform a PhD thesis under the supervision of one member of the group. The selected candidate will enrol in one of the lines of stated below, depending on his/her preference and background.

- Driven holography and Floquet systems. The interplay of periodic driving and disorder in many body systems allows for various phases, including topologically protected quasiparticles, many-body localisation, time crystals etc. The dual geometry involves a gravitational system with time periodic boundary conditions.
- Quantum chaos, scrambling and thermalisation in strongly coupled systems. Quantum information theoretic tools, entanglement entropy and complexity growth. A particular focus in systems like heavy ion collisions modelled through gravitational shocks.
- Out of equilibrium and transport properties of low dimensional holographic models and systems with flavour degrees of freedom and multi-layered systems.
- Higher derivative corrections to Einstein gravity. Inputs and constraints of a generic theory of quantum gravity: from unitarity to causality and vice versa

The string theory group, composed by four faculty senior members (Alfonso Ramallo, José Luis Miramontes, José D. Edelstein and Javier Mas) and a variable number of postdocs and predoctoral students, fosters its research activity in topics related to string theory, holography and quantum gravity with a high level of scientific productivity and enjoys a fair amount of international connections and collaborations. In the last five years, five PhD students have finished their doctorate. All of them are now doing their postdocs in renowned foreign institutions. The selected student will enjoy a fruitful scientific atmosphere with regular seminars and lectures on the topics mentioned above.

Job description

The position is a regular predoctoral 3-year position whose final aim is the elaboration of a PhD thesis. The academic requisites are the ones demanded by the Doctorate Program in

Particle Physics of the Department of Elementary Particle Physics and Condensed Matter of the Universidad de Santiago de Compostela, to which the candidate will have to enrol. The candidate should provide a cover letter stating his/her main interests within the list given before. Also, he should attach a CV containing his scores in degree and master, as well as one letter of recommendation. For any further details, he/she can contact the group leader.