XI International Conference on New Frontiers in Physics

Tuesday 30 August 2022 - Monday 12 September 2022

r, Kolymbari, Crete, Greece. The conference will take place in Crete in physical form, howeve

Scientific Program

The conference series "New Frontiers in Physics" aims to promote interdisciplinarity and cross-fertilization of ideas between different disciplines addressing fundamental physics. While different fields each face a distinct set of field-specific challenges in the coming decade, a significant set of commonalities has emerged in the technical nature of some of these challenges, or are underlying the fundamental concepts involved. A Grand Unified Theory should in principle reveal this underlying relationship.

For instance, techniques from string theory have become relevant in recent years for improving perturbative techniques in high energy physics or identifying material properties of non-abelian plasmas that share essential features with the systems studied in heavy-ion collisions. Fluctuation analyses of the cosmic microwave background involve techniques and concepts that are becoming increasingly relevant for the study of the quickly expanding little bangs in heavy-ion collisions. Cosmological models are developed in close interplay with searches for new physics at the LHC. There is a multitude of examples illustrating that crosstalk between neighbouring fields is relevant or even crucial for progress in either field.

The conference series "New Frontiers in Physics" aims at identifying interdisciplinary topics on which crosstalk between different disciplines of fundamental physics can contribute to further progress. The conference series aims at bringing together key scientists of different fields to discuss the state of the art and the nature of open questions in a language suitable for a physics educated interdisciplinary audience and to discuss avenues for further progress.

Main topics

While the main body of the conference builds mainly on the below-mentioned topics, presentations on yet different disciplines are invited and vary every year. Such topics include nuclear structure, atomic physics, plasma physics, physics applications (biophysics, medical science), biology, mathematics, computing science, etc.

High Energy Particle Physics

Searches for new particles and new phenomena (Higgs boson, SUSY, top quarks, extra dimensions, flavour physics, precision electroweak measurements and others), hadron physics, and neutrino physics.

Heavy Ion Collisions and Critical Phenomena

The properties of QCD matter under extreme conditions and the QCD phase diagram. Branching out to neighbouring disciplines: Superconductivity, Neutron Stars, Quark Stars, Exotics.

Quantum Physics, Quantum Optics and Quantum Information

Quantum Optics, Quantum Information, Foundations of Quantum Mechanics, Quantum information; Entanglement and the Universe: Black Holes and Cosmology, Quantum Non-Locality, Cold Atoms.

Cosmology, Astrophysics, Gravity, Mathematical Physics

Cosmic Microwave Background, Dark Energy, Gravitational waves, Dark Matter, Astroparticle Physics, Quantum Gravity, String Theory, Non-Commutative Geometry, Holography.

Workshops

Workshops and mini-Workshops will be also organized during the conference:

Workshop on Lattice Field Theory and Condensed Matter Physics

Workshop on Physics of Exotic Nuclei

Workshop on New physics paradigms after Higgs and gravitational wave discoveries

Workshop on Higgs Physics

Workshop on Physics at FAIR-NICA-SPS-BES/RHIC

Workshop on Heavy Ion Physics

Mini-workshop on Correlations and Fluctuations in Relativistic Heavy Ion Collisions

Mini Workshop on Instruments and Methods in HEP

Workshop on Future of Fundamental Physics

Workshop on Heavy Neutral Leptons

Mini-workshop on Machine Learning for Particle Physics

Workshop on Astro-Cosmo-Gravity

Workshop on Laser Fusion, a spin-off from heavy-ion collisions

Workshop on QCD

Special Sessions

Lepton-Nucleus scattering and Structure of the Nucleon

Physics Education and Outreach

Diversity and Inclusion

Extended Session

Lectures

Multidisciplinary session