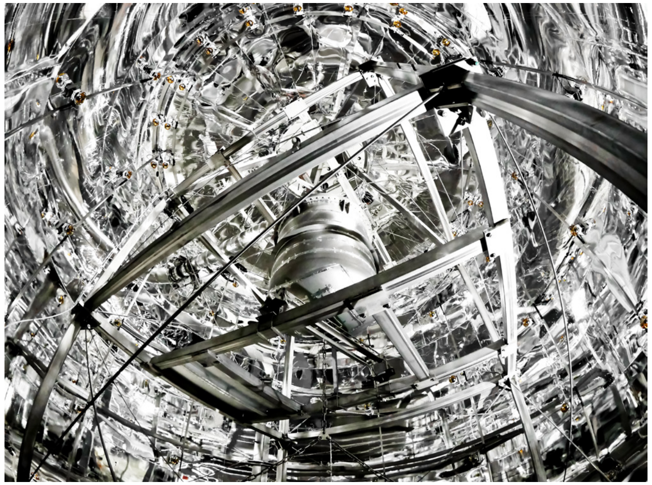


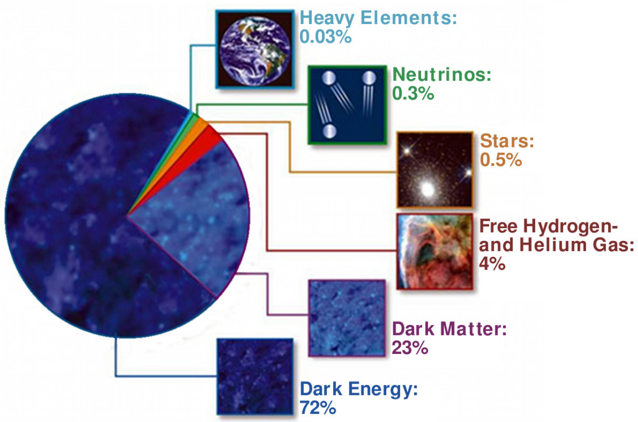
Direct detection of Dark Matter is the goal of the XENONnT experiment in the Gran Sasso underground laboratory. (© XENON collaboration)

How to Apply

Calls for application take typically place in May and November, with interviews taking place in July and December. Please check the web-page

www.mpi-hd.mpg.de/imprs-ptfs

for details. It is expected that students have obtained the minimum of a Master's degree in Physics or equivalent with a grade of 2.0 or better in the German system. This corresponds roughly to a "B+" grade or better in the American or British system.



Composition of the Universe. What lies behind the mysterious Dark Matter and Dark Energy? (© NASA)

IMPRS Precision Tests of Fundamental Symmetries

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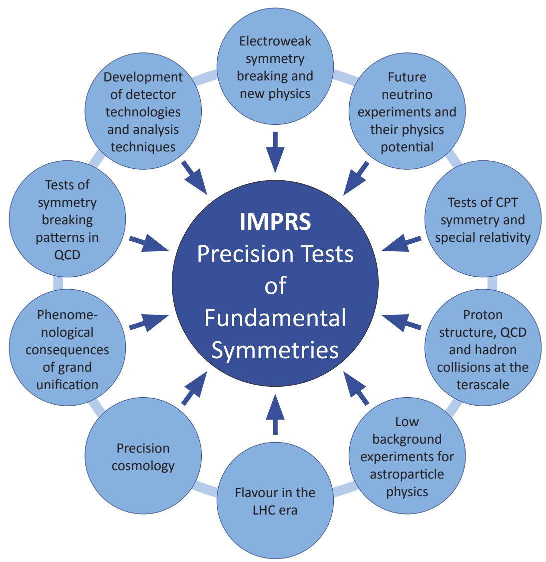
The Max-Planck-Institut für Kernphysik (MPIK) is one of 86 institutes and research establishments of the Max-Planck-Gesellschaft. The MPIK does basic experimental and theoretical research in the fields of Astroparticle Physics and Quantum Dynamics.

MAX PLANCK GESELLSCHAFT

International Max Planck Research School

Precision Tests of Fundamental Symmetries



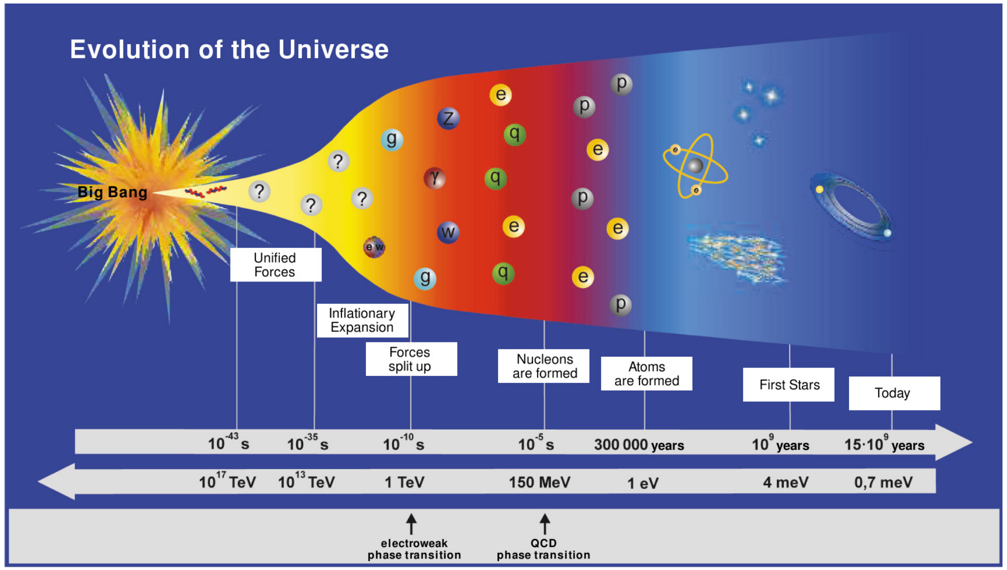
International Max Planck Research School

Precision Tests of Fundamental Symmetries

The International Max Planck Research School for Precision Tests of Fundamental Symmetries in Particle Physics, Nuclear Physics, Atomic Physics and Astroparticle Physics (IMPRS-PTFS) is a combined graduate school of the Max Planck Institute for Nuclear Physics (MPIK) in collaboration with the University of Heidelberg (UH).

Overview

At Germany's largest physics department, excellent PhD students receive a broad and up-to-date education by world-renowned experts in various fields of fundamental physics, with particular emphasis on inter- and crossdisciplinarity. The School would also like to familiarize the students with research facilities in Germany and spark the students' interest for future cooperative activities with German research institutes. The aim is to have foreigners account for at least half of the student body. Courses on soft skills are also provided. The working and teaching language of the IMPRS is English, knowledge of the German language is not mandatory.



Investigation of the various steps in the evolution of the Universe is performed at the IMPRS.

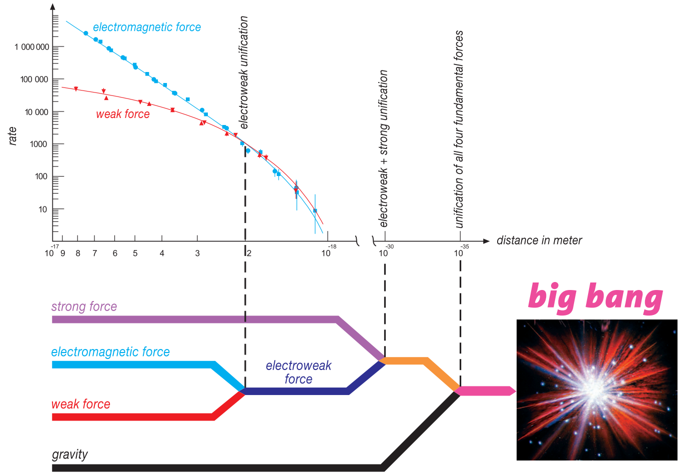
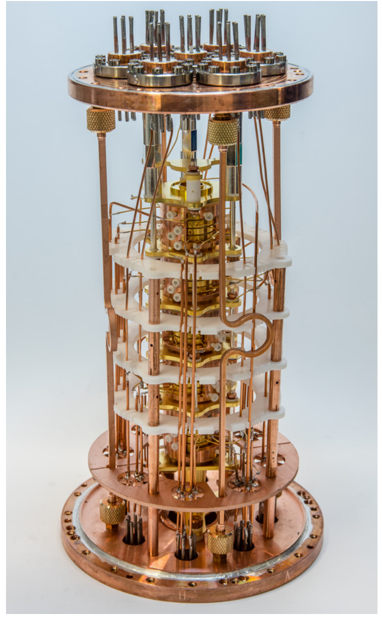


Illustration of the grand unification. It is expected that all fundamental forces unite at high energies or, equivalently, at early times in the evolution of the Universe. Theoretical realizations and experimental consequences and constraints are topics of the IMPRS. (© DESY press archive)

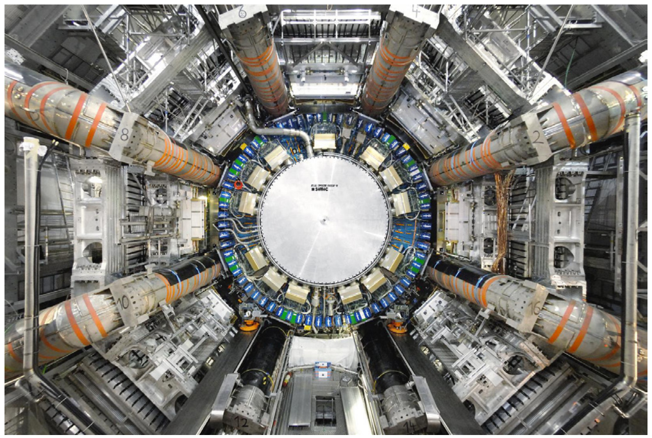
Research Topics

The scientific basis of the IMPRS is fundamental physics, which has the goal to identify, understand and explain the most basic laws of Nature. The theoretical and experimental description and interpretation of the involved systems in a fundamental manner requires sound and in particular very broad knowledge of a variety of research fields. Scientists involved in the IMPRS attack the frontiers of our knowledge on fundamental physics from all sides, be it with low-energy neutrino and Dark Matter investigations, ultraprecise ion trap and storage ring measurements, or with high-energy LHC physics. Both theoretical and experimental perspectives are covered in the school.

Big questions can in principle be answered, such as: What is behind the mechanism responsible for the breaking of the electroweak symmetry? What lies behind the existence of generations of quarks and leptons? What causes small neutrino masses and how can we determine neutrino properties and parameters? Are lepton number or baryon number conserved quantities? Is CPT and Lorentz invariance conserved? Are fundamental constants really constant? What are the properties of the quark-gluon plasma and of chiral symmetry at high temperatures? How is the matter-antimatter symmetry violated and how does it lead to the baryon asymmetry of the Universe? What are the properties of Dark Matter and Dark Energy?



The determination of atomic properties such as masses or magnetic moments to the highest precision requires the observation of single, isolated ions, e.g., in Penning traps such as the PENTATRAP. (© MPIK)



The detector of the ATLAS experiment at the LHC at CERN. The production and detection of new particles is investigated theoretically and experimentally. (© CERN)