HadronPhysics2: Study of Strongly Interacting Matter

Hadron physics deals with subatomic particles subject to strong nuclear force and modelled using the theory of quantum electrodynamics. It is a field that depends equally on theoretical research, carried out on some of the world's most powerful supercomputers, and experiments using particle accelerators. The EU-funded HadronPhysics2 project, the continuation of HadronPhysics, is improving transnational access to nine of Europe's research facilities, and is coordinating research into accelerator targets that will allow scientists to tackle new problems.

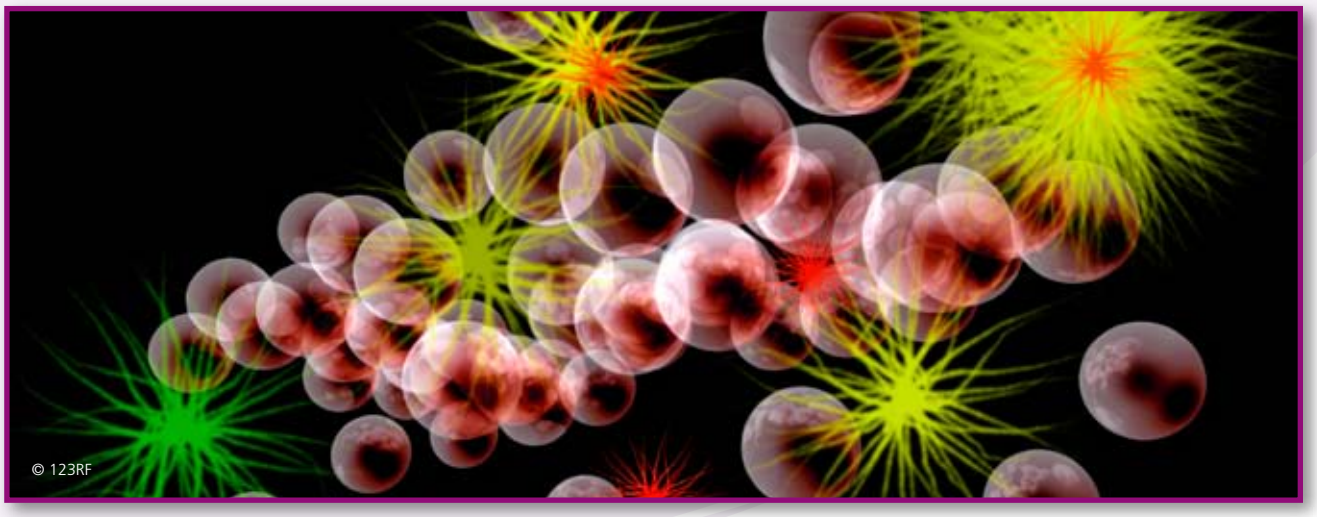
A STRONG FORCE IN PHYSICS RESEARCH

Hadron physics deals with the study of strongly interacting subatomic particles (hadrons) such as protons and pions. Hadrons are described by quantum chromodynamics (QCD), the theory physicists use for the strong nuclear force – one of the four fundamental forces controlling the universe. Hadrons, which are composed of sub-particles known as quarks and gluons, can join together to form more complex systems such as atoms. Under extreme conditions of pressure and temperature, hadrons may also lose their identity and dissolve into a new state of matter similar to the primordial components of the early universe.

The HadronPhysics2 project is a huge initiative to unify and stimulate this field of research in Europe. Backed by 46 institutions, it covers 8 networking activities and 14 joint research activities (JRAs). Its overall effect will be to further unite three previously separate communities of researchers: those who study hadrons by means of leptons, by means of hadrons or by means of high-energy beams of heavy ions.

The networking activities of HadronPhysics2 will link the research programmes through the coordination of their work and resources. Two of the networking activities are dedicated to theoretical interpretation and modelling of experimental results. Four networking activities are developing theory and experiments. The final two are aimed at ensuring the success of key experiments throughout the course of the project.

The transnational access activities of HadronPhysics2 cover five European hadron physics laboratories. Together, these activities provide researchers across the globe with access to the most advanced hadron research facilities. Two of these activities in particular are focused on ensuring the complementarity of approaches.



SEVENTH FRAMEWORK PROGRAMME

EUROPEAN COMMISSION

GOING TO THE NEXT LEVEL

The experiments planned as a part of the HadronPhysics2 project are taking research in the field of hadrons to the next level. Researchers will study the rare hadron processes with greatly improved sensitivity. To achieve this, improved high-beam intensities and lumonisities are needed along with fast radiation-hard detectors with large acceptance, high resolution and low-material budget. Other experiments look at gaseous and solid targets for (un)polarised proton and light nuclei. Furthermore, certain projects are developing computer technologies to perform new generation lattice calculations.

The main objective of HadronPhysics2 is to investigate, experimentally and theoretically, the forces between the elementary building blocks of matter which govern the structure of hadrons, and the properties of strongly interacting matter under extreme conditions as it exists in the early universe. Such research brings together the major particle accelerator facilities in Europe and attracts the interest of scientists all over the globe. It is hoped that this project will improve the performance of European research infrastructures, develop advanced theoretical methods and foster global collaboration in the field.

Project acronym: HadronPhysics2

Funding scheme (FP7): Integrated Activities (IA)

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EU project officer: Christian Kurrer

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Oesterreichische Akademie der Wissenschaften (AT)
Karl-Franzens Universitaet Graz (AT)
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