Universität Basel

Research Project

Matter Forces and the Universe

Third-party funded project

Project title Matter Forces and the Universe
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Organisation / Research unit
Departement Physik / Theoretische Physik (Antusch)
Department
Project start 01.10.2015
Probable end 30.09.2017
Status Completed

The goal of the proposed research project is to contribute towards the development of a more fundamental theory of matter, forces and the universe, which resolves the open challenges of the Standard Model of elementary particles and the Concordance (LambdaCDM) Model of cosmology. The project will approach this goal from three directions in subproject, corresponding to the following three challenges: (A) origin of neutrino masses, (B) unification of forces and (C) early universe cosmology. Within the subprojects, new ideas for resolving the respective challenges will be developed, and existing ideas will be improved and explored. Based on these ideas, new theoretical models will be built and their predictions for observables at ongoing and future experiments will be derived. The necessary tools for accurate model analysis will be further developed. In addition, new connections between the three research directions (A), (B) and (C) will be explored. Ongoing and future experiments, such as collider experiments, precision neutrino experiments, flavour experiments and cosmological observations will provide new experimental results, which will allow test the validity of the developed theoretical candidate models. The results of the proposed research will contribute to selecting the right way forward towards a more fundamental theory of particle physics and cosmology.

Keywords grand unified theories, neutrino physics, early universe cosmology
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