

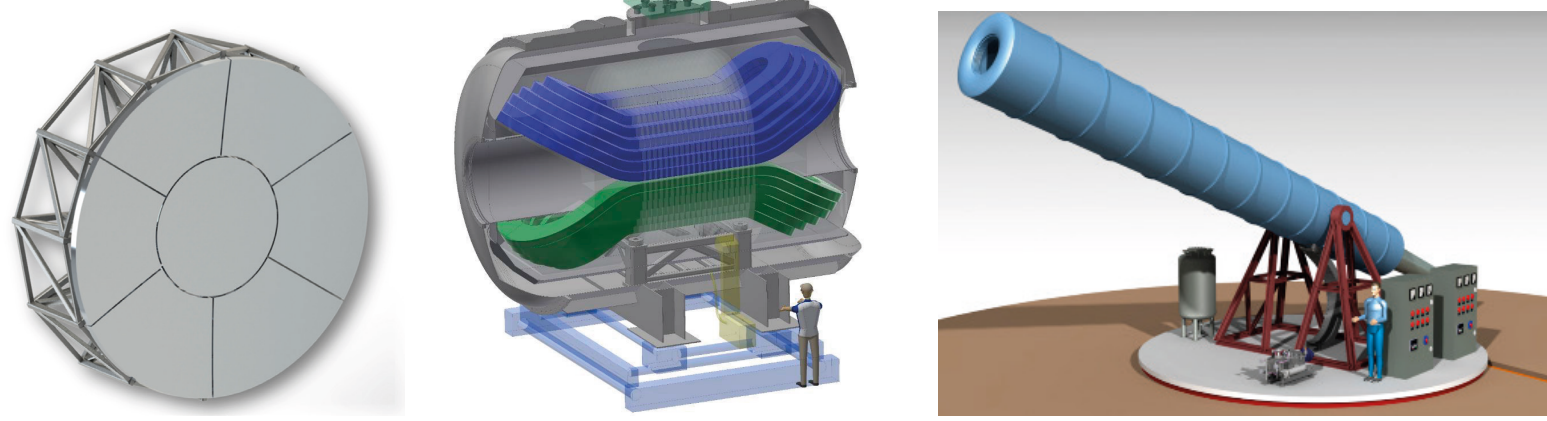
VISION

Understand the fundamental puzzle of mass and gravity at the interface between quantum physics and cosmology

KEY QUESTIONS

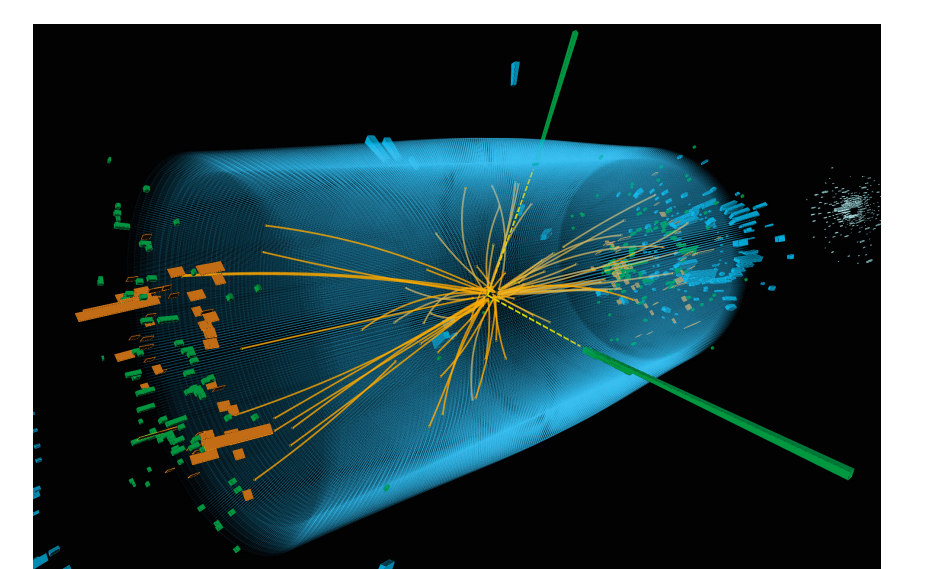
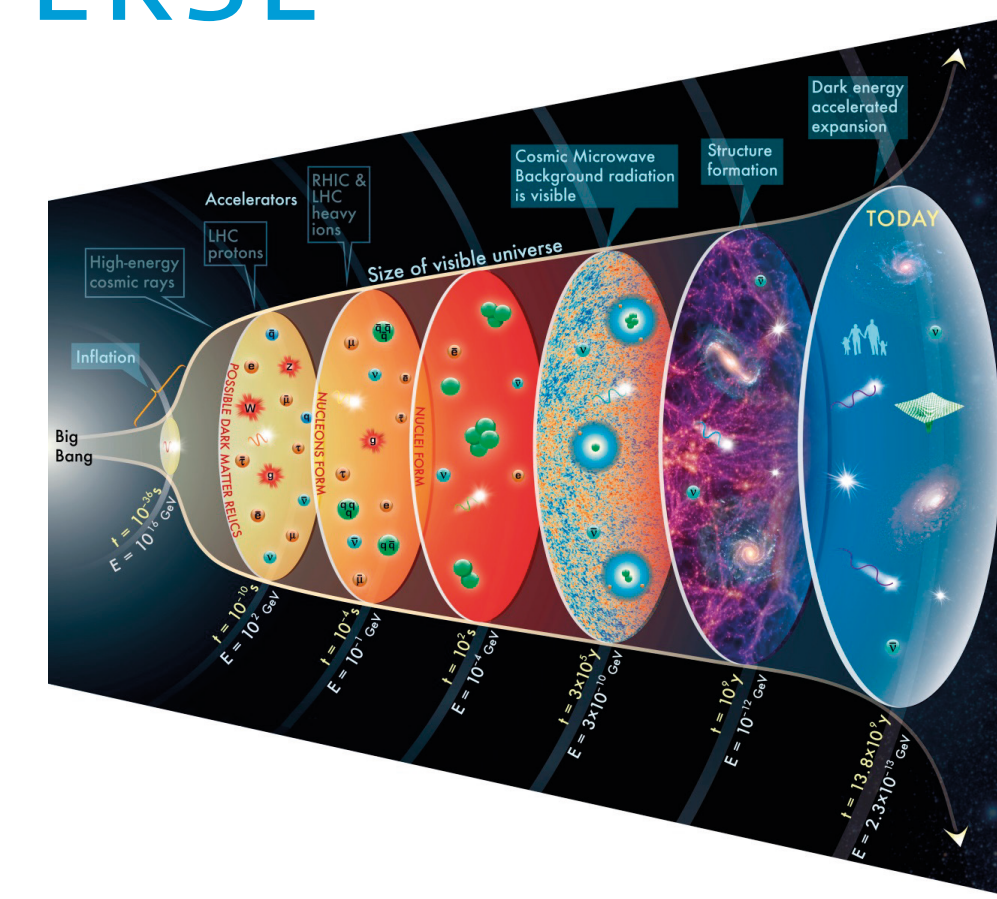
- How is the quantum origin of mass connected to the evolution of the Universe?
- What is the nature of Dark Matter of the Universe?
- How is gravity related to the quantum world?

OBJECTIVES OF QUANTUM UNIVERSE



Mass and Gravity

Combine new approaches in quantum physics, cosmology, and mathematics

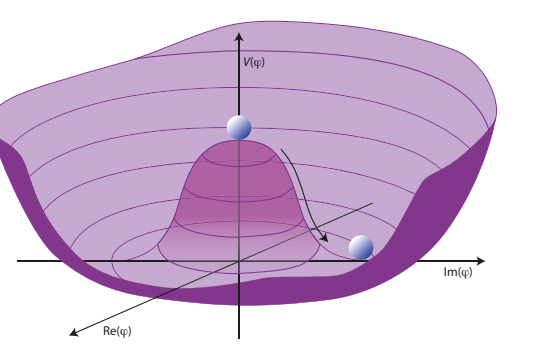


Dark Matter

Search for Dark Matter interactions in collider experiments, in the laboratory, and in the cosmos, build new hub for WISP experiments in Hamburg

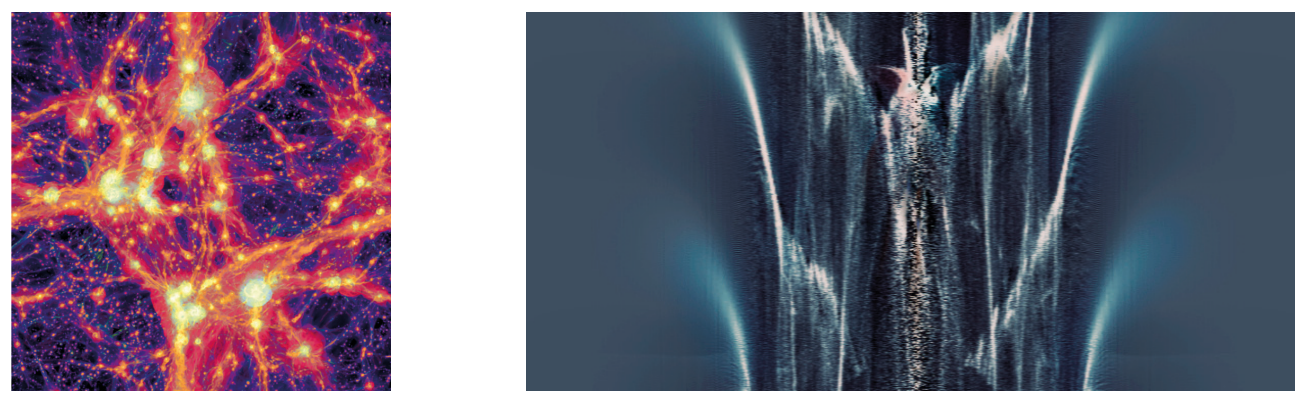
Higgs Physics

New measurements at particle colliders to reveal the origin of mass, cosmological implications, and the nature of fundamental interactions



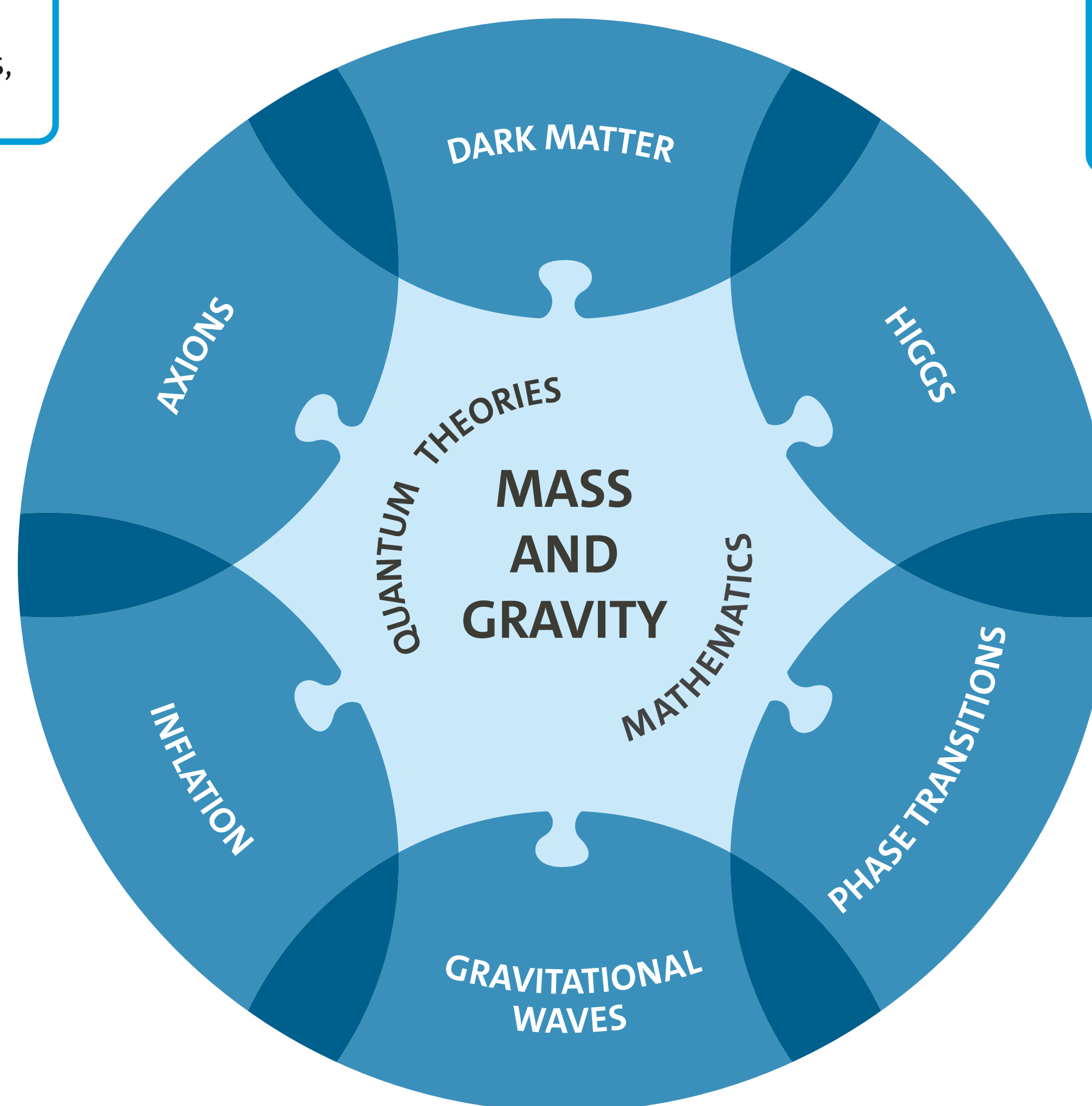
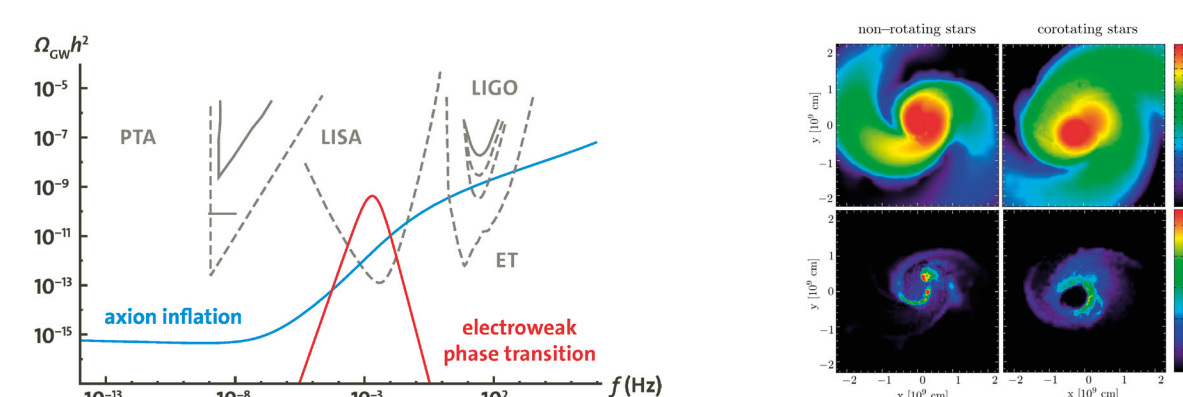
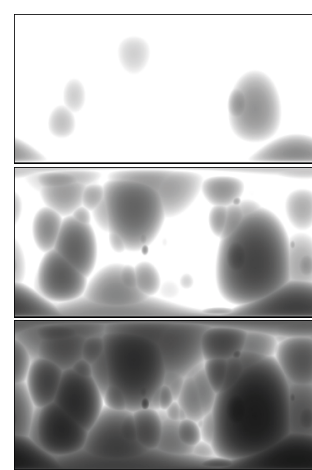
Astrophysical Plasmas

Understand magnetized plasmas in astrophysics through novel experiments at plasma wakefield accelerators in Hamburg



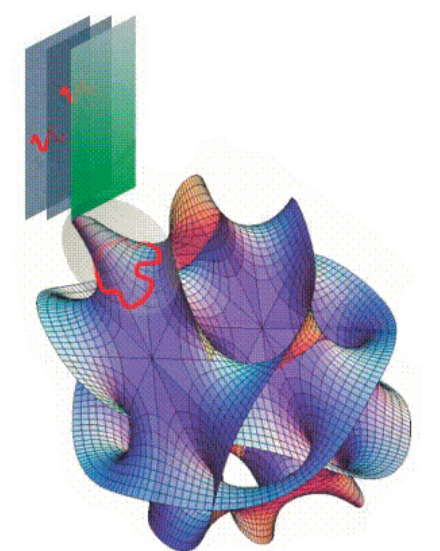
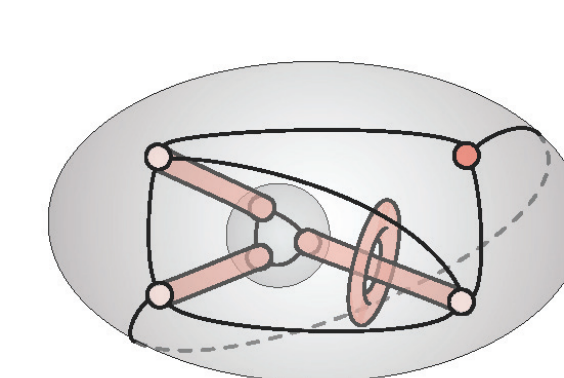
Gravitational-Wave Sources

Theory of cosmological and astrophysical sources, observation and analysis of electromagnetic counterparts



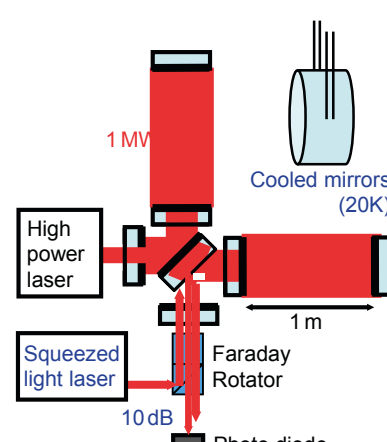
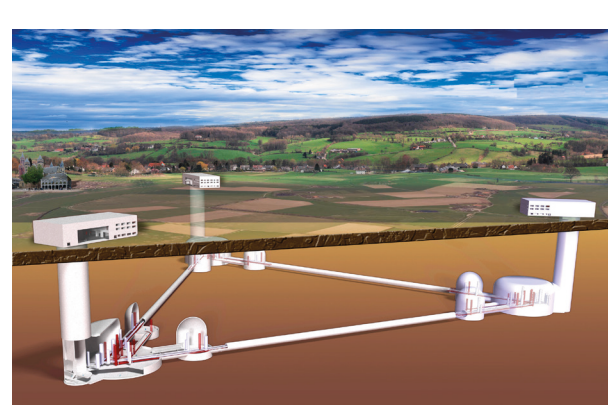
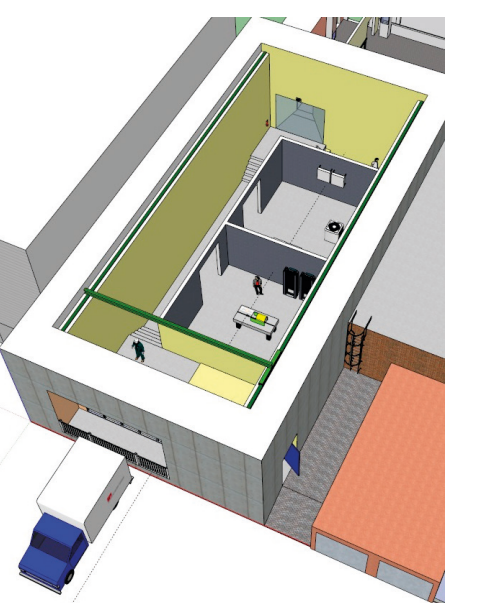
String Theory and Quantum Field Theory

New mathematical tools for Higgs physics, Dark Matter, and cosmology



Cross-disciplinary Platforms

Exploit synergies and knowledge transfer



Gravitational-Wave Experiments

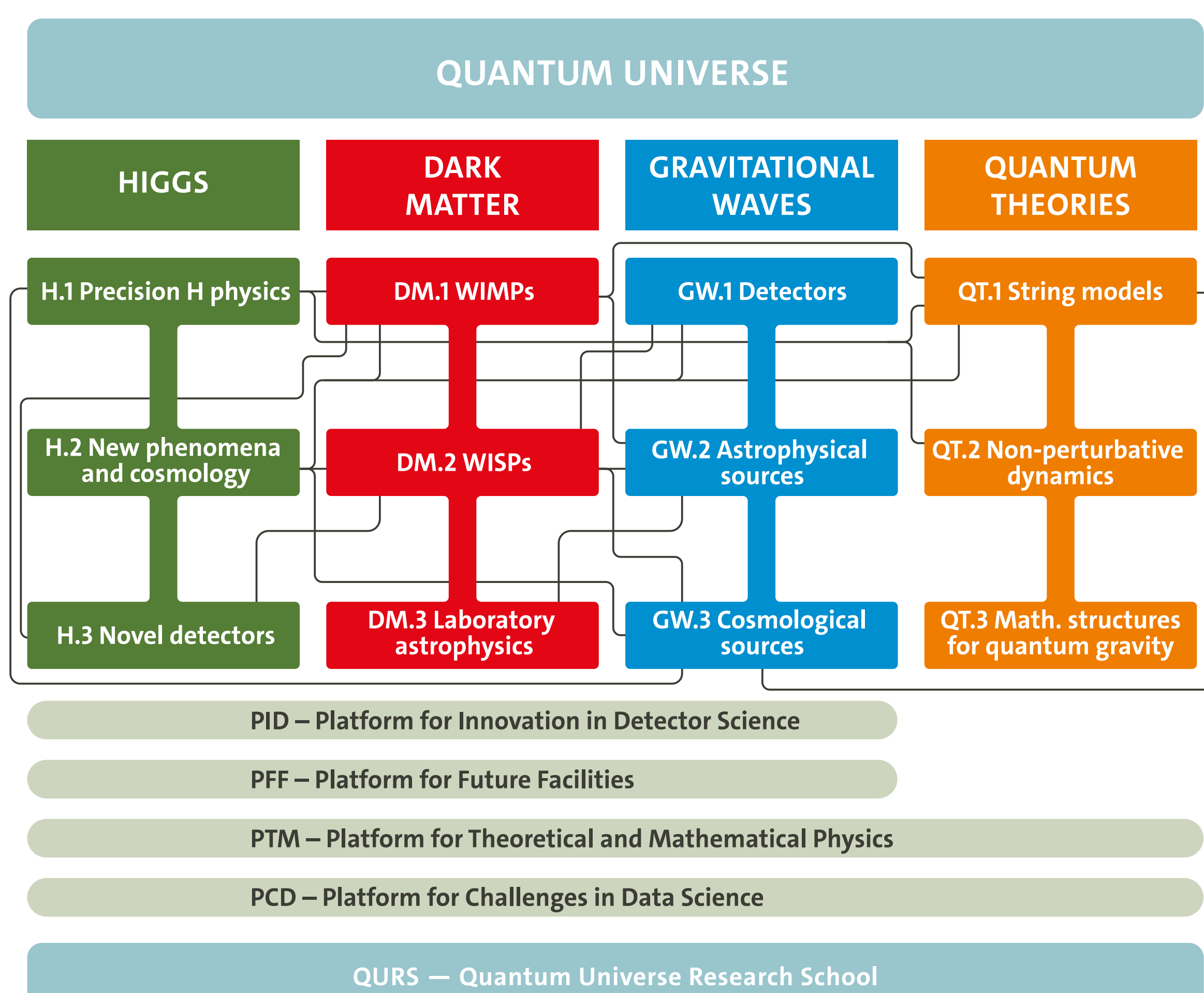
Develop new experimental techniques for next generation observatories

Educate Leaders in Science and Economy

Mentoring and training in a world-class scientific environment
Promotion of equality, diversity, and transfer



PROJECT STRUCTURE



Fascination for Science

Outreach to schools and society at large



TECHNOLOGY TRANSFER

- squeezed-light sources for precision technology
- small scale laser plasma accelerators for medical imaging and therapy
- fluorescence detection of gold nanoparticles for medical imaging
- detector technology for medical imaging (e.g. PET, single photon resolving X-ray detectors)
- radiation hard silicon photomultipliers (SiPMs)
- big data, data mining, data preservation
- data science, machine learning

New joint innovation center of DESY and Universität Hamburg for spin-off companies

