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Einstein Telescope - The future European Gravitational Wave Observatory

The Einstein Telescope (ET) is a groundbreaking scientific initiative aiming to build a third-generation gravitational wave observatory with the ambitious goal of revolutionizing our understanding of the Universe. ET will greatly exceed the sensitivity and range of current detectors, unlocking new horizons by detecting gravitational waves—spacetime ripples produced by events such as merging black holes and neutron stars. This observatory will be a true game changer, a tool that promises breakthroughs in our understanding of fundamental physics, astrophysics, and cosmology, ranging from the role of the gravitation in the description of the Dark Universe, the QCD of Neutron Stars and the mechanisms of the expansion of the Universe. Methods, scientific targets and technical challenges are synergic and complementary to the HEP targets at CERN. ET's research infrastructure requires cutting-edge technology to surpass the sensitivity and detection capabilities of current observatories like LIGO, Virgo and KAGRA. Technological developments across multiple fields, including quantum computing and artificial intelligence, life and environmental science, electronics and high-precision optics, mechanics and vacuum, and many other are needed to face the scientific challenges. Currently, ET is one of the largest projects in the ESFRI roadmap

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