Background

LRP2024 launched

→ 36 pages, detailed

→ 25 contributors listed

Nuclear Astrophysics

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Background II

The Science of the Einstein Telescope (aka "The BlueBook")	
File(s)	ET-0036B-25.pdf (54.5 MB)
Document type	Official document
Abstract	Einstein Telescope (ET) is the European project for a gravitational-wave (GW) observatory of third-generation. In this paper we present a comprehensive discussion of its science objectives, providing state-of-the-art predictions for the capabilities of ET in both geometries currently under consideration, a single site triangular configuration or two L-shaped detectors. We discuss the impact that ET will have on domains as broad and diverse as fundamental physics, cosmology, early Universe, astrophysics of compact objects, physics of matter in extreme conditions, and dynamics of stellar collapse. We discuss how the study of extreme astrophysical events will be enhanced by multi-messenger observations. We highlight the ET synergies with ground-based and space-borne GW observatories, including multi-band investigations of the same sources, improved parameter estimation, and complementary information on astrophysical or cosmological mechanisms obtained combining observations from different frequency bands. We present advancements in waveform modeling dedicated to third-generation observatories, along with open tools developed within the ET Collaboration for assessing the scientific potentials of different detector configurations. We finally discuss the data analysis challenges posed by third-generation observatories, which will enable access to large populations of sources and provide unprecedented precision.
Author(s)	ET Collaboration. Coordinated by M. Branchesi, A. Ghosh and M. Maggiore

The Science of the Einstein Telescope

Einstein Telescope collaboration
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Context

NuPECC Input to ESPPU	Document	2025
The NuPECC Long Range Plan 2024 for European Nuclear Physics"	LRP	2024
NuPECC Long Range Plan 2024 Brochure "Perspectives for European Nuclear Physics"	Brochure	2024
NuPECC Special Report "Nuclear Physics in Everyday Life"	Report	2022
LRP 2017 Assessment of Implementation	Report	2022
NuPECC Self-Evaluation Report 2020	Report	2020
NuPECC Long Range Plan 2017 Brochure "Nuclear Physics and its Applications"	Brochure	2017
NuPECC Long Range Plan 2017: Perspectives of Nuclear Physics	LRP	2017

Proposal

Nuclear Physics in Astrophysics

→ Short document (order of magnitude 10 pages)

→ Aimed at policy makers, “trained” public

→ Stress upcoming plans but also existing examples with high impact

→ Gather a small group from the existing list of contributors

→ Bridge potential gaps, make NP case stronger in view of ET

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