

INSTITUTO GALEGO
DE FÍSICA
DE ALTAS ENERXÍAS

IGFAE

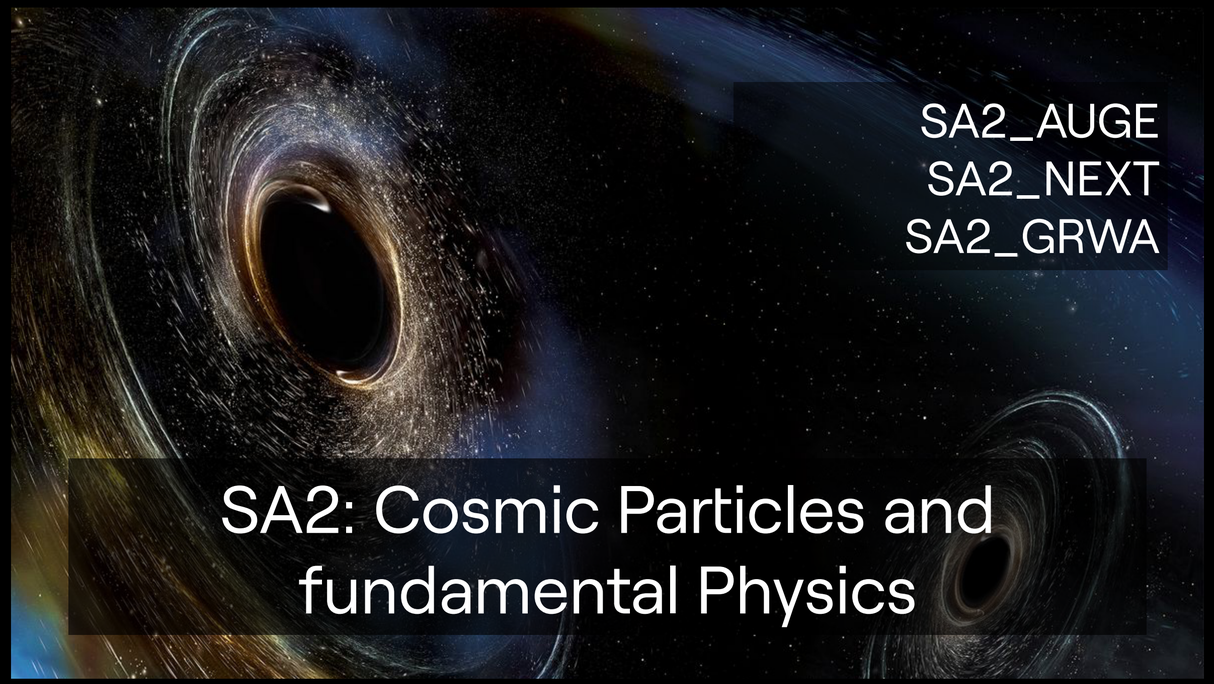
- IGFAE created in 1999
  Joint research center Xunta-Universidade de Santiago de Compostela
- Reference in Galicia for relation with big international infrastructures (CERN and more)
- Strong boost after excellence accreditation in 2017
  María de Maeztu
- New headquarters — official opening June 25th
  Designed to ignite a new phase of expansion
  New experimental facilities

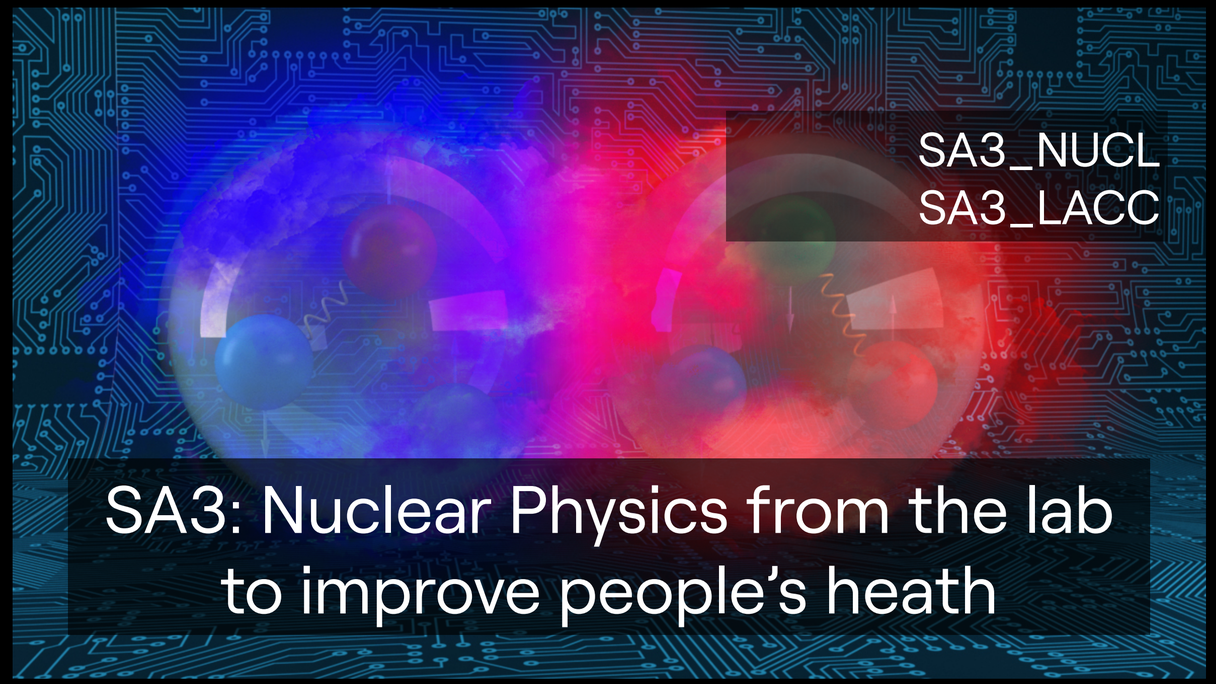


IGFAE

Strategic Research Areas
Some highlights







SA1_LHCB — Beyond Standard Model searches with LHCb

LHCb instrumentation

Installation completed in March 2023
R&D for LHCb upgrade phase-II (2030's) underway

Strong Analysis group

- Lepton-flavor universality
- CP violation in B decays
- Rare decays
- Long-lived particles
- Hot and dense QCD...

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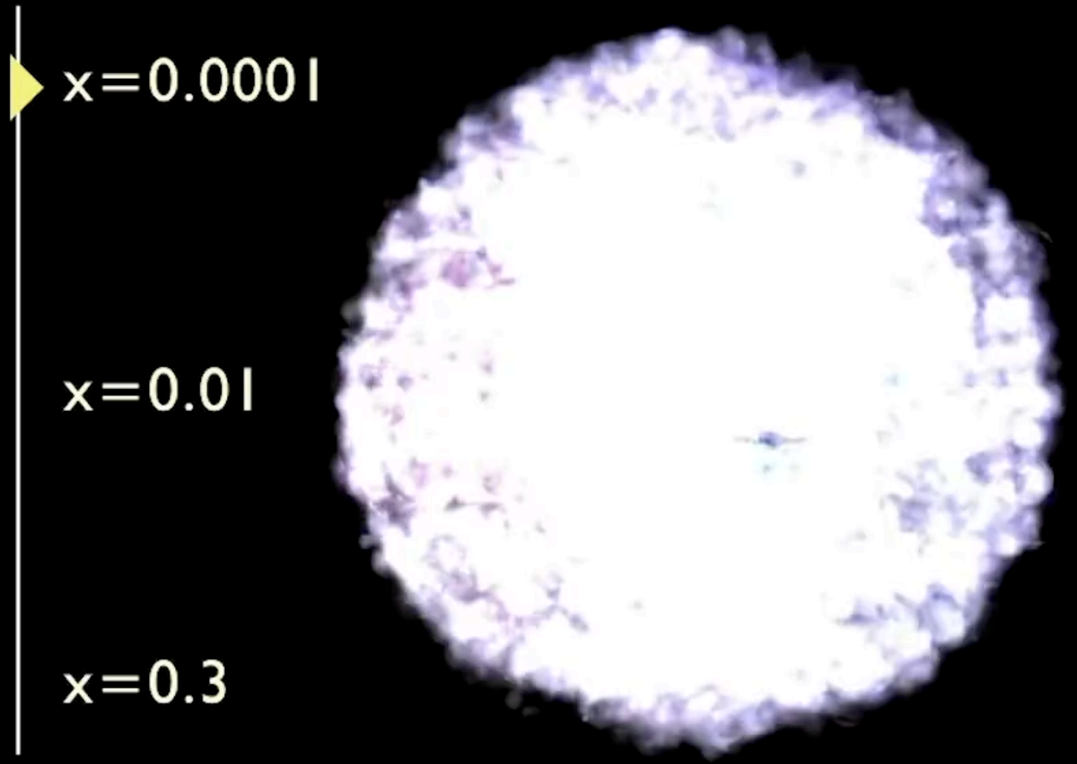
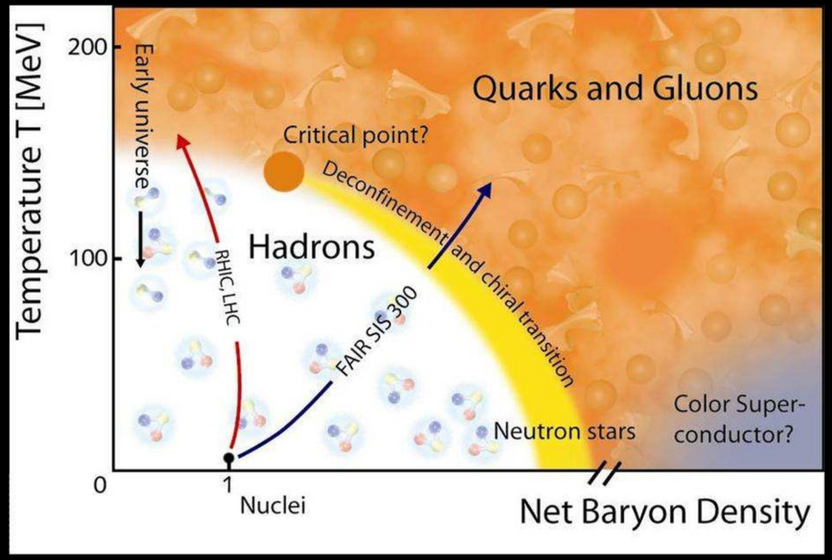
SA1_HQCD – Hot and dense QCD in the LHC era and beyond

Unveil the structure of hadrons & nuclei



[Animation: Visualizing the proton - Arts at MIT]

Hot and dense QCD
The Quark-gluon plasma



Heavy-ion collisions and compact stars

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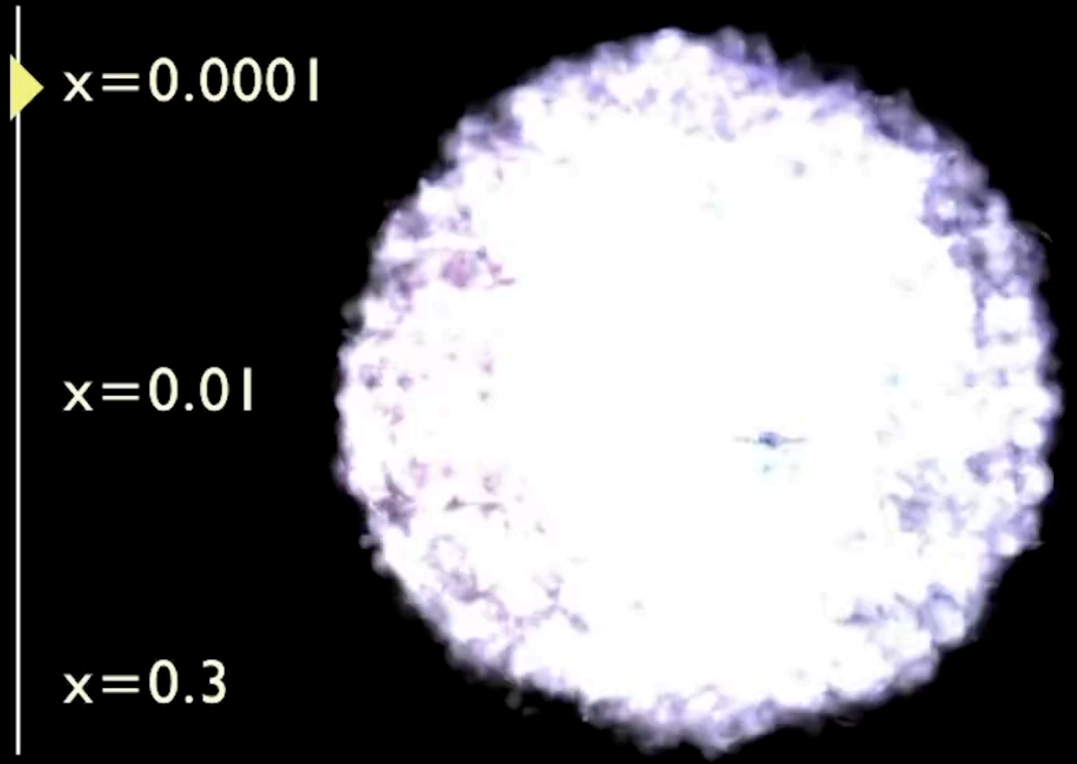

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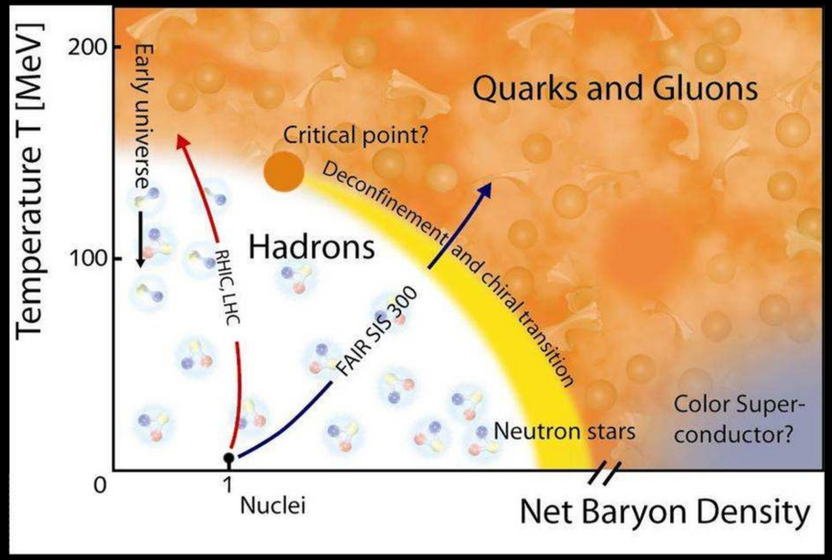
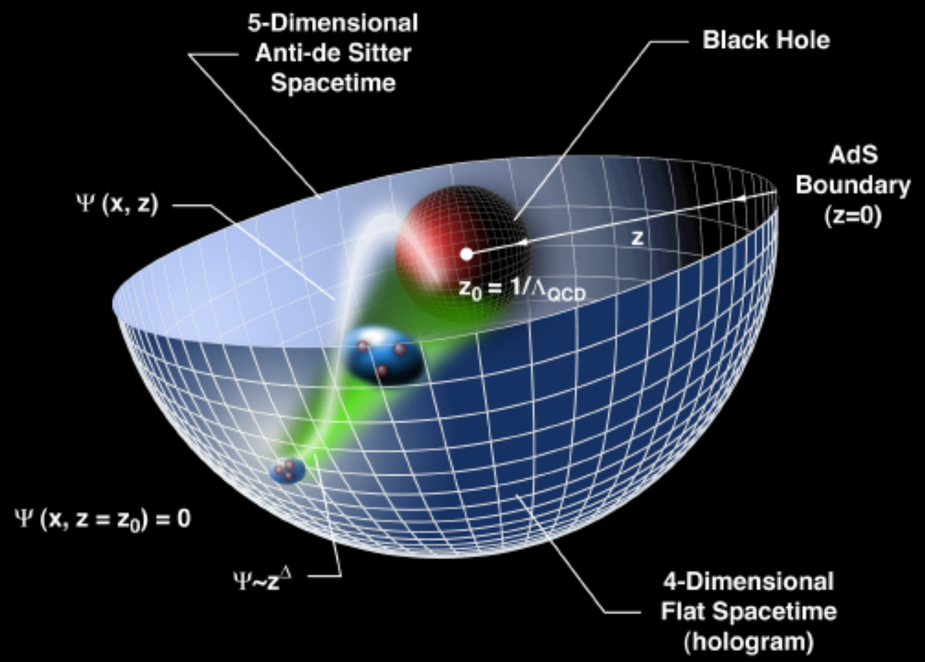


Heavy-ion collisions and compact stars

SA1_STRI — String Theory and related fields



Quantum systems in strong coupling with holography

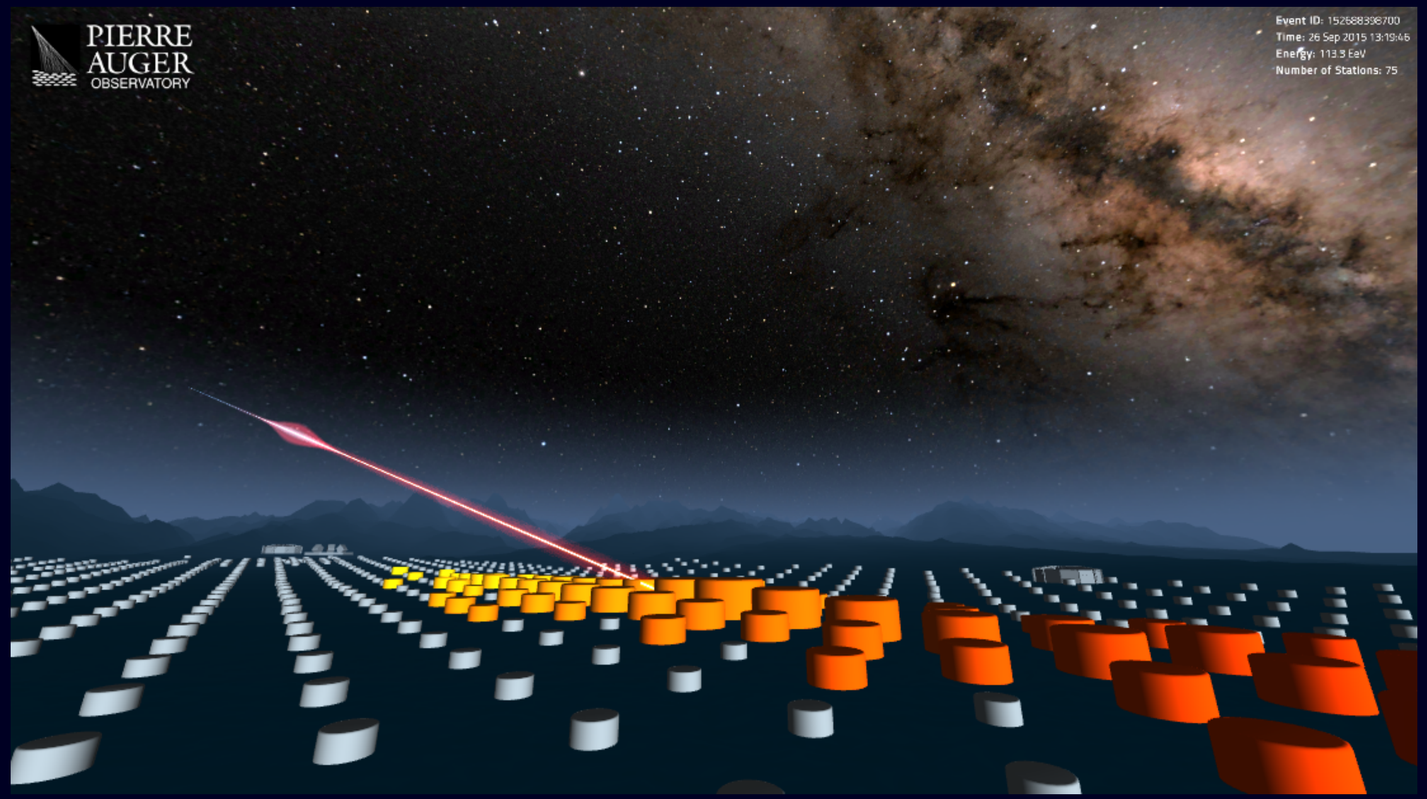
Integrability in String Theory and AdS/CFT correspondence

From GR to Quantum Gravity

Quantum information and computing

SA2_AUGER – Pierre Auger Observatory

Cosmic rays thousands of times more energetic than LHC



[New ERC Synergy grant - Jaime Alvarez-Muñiz - new experiment HERON]

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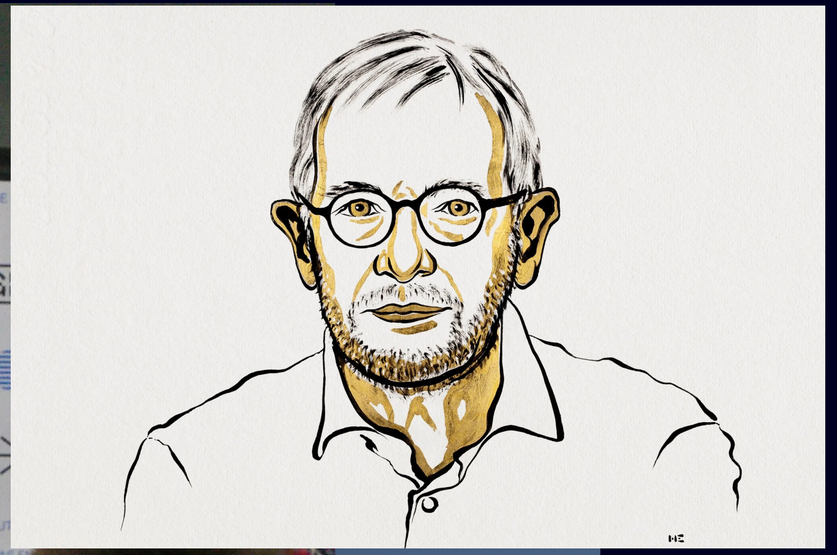

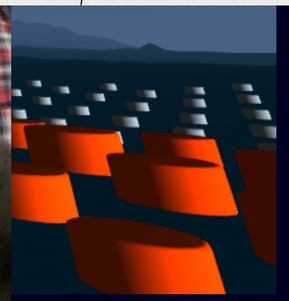

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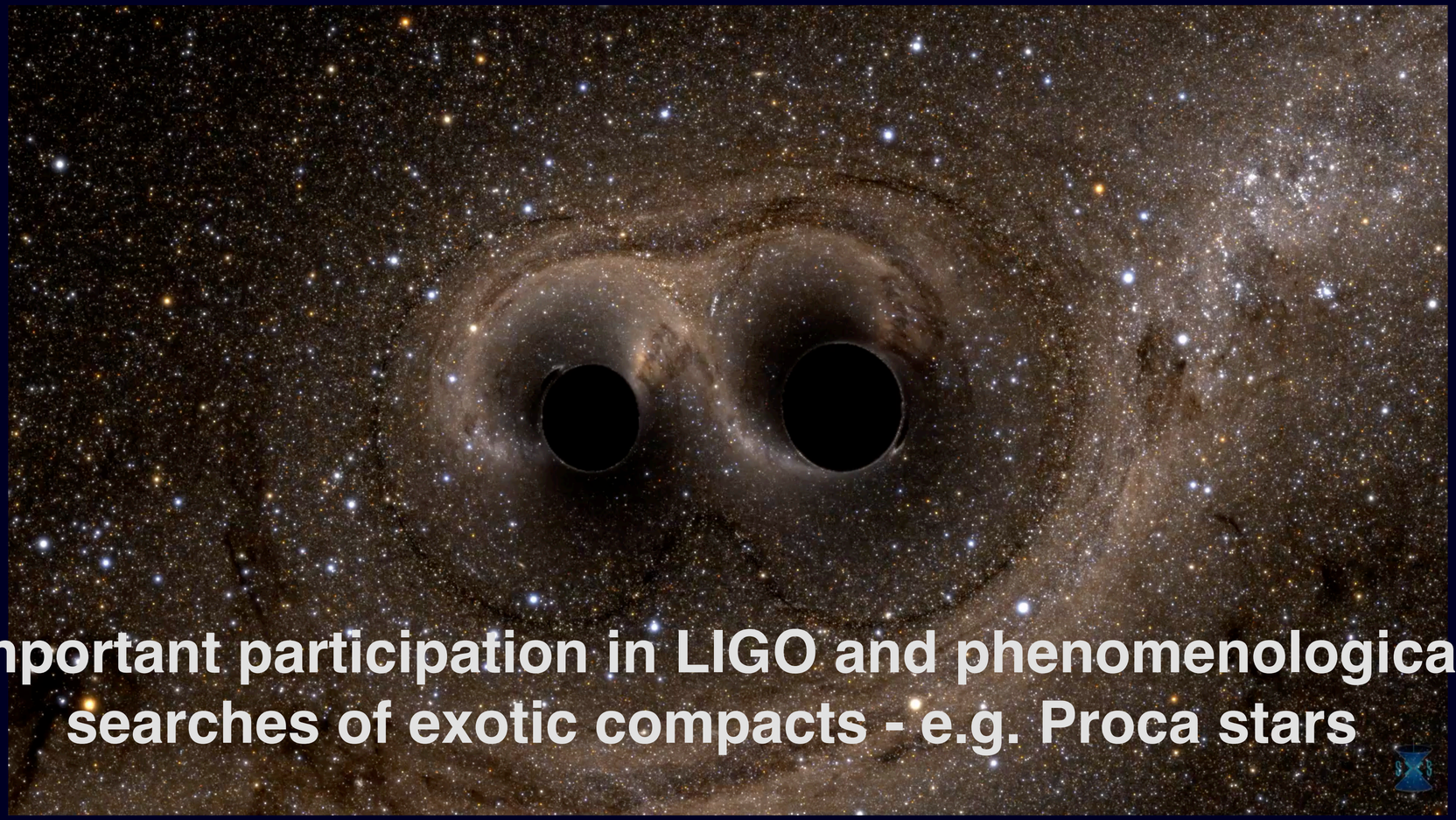
SA2_GRWA — Gravitational waves

Prediction of General Relativity

A new way to observe the Universe



Important participation in LIGO and phenomenological searches of exotic compacts - e.g. Proca stars

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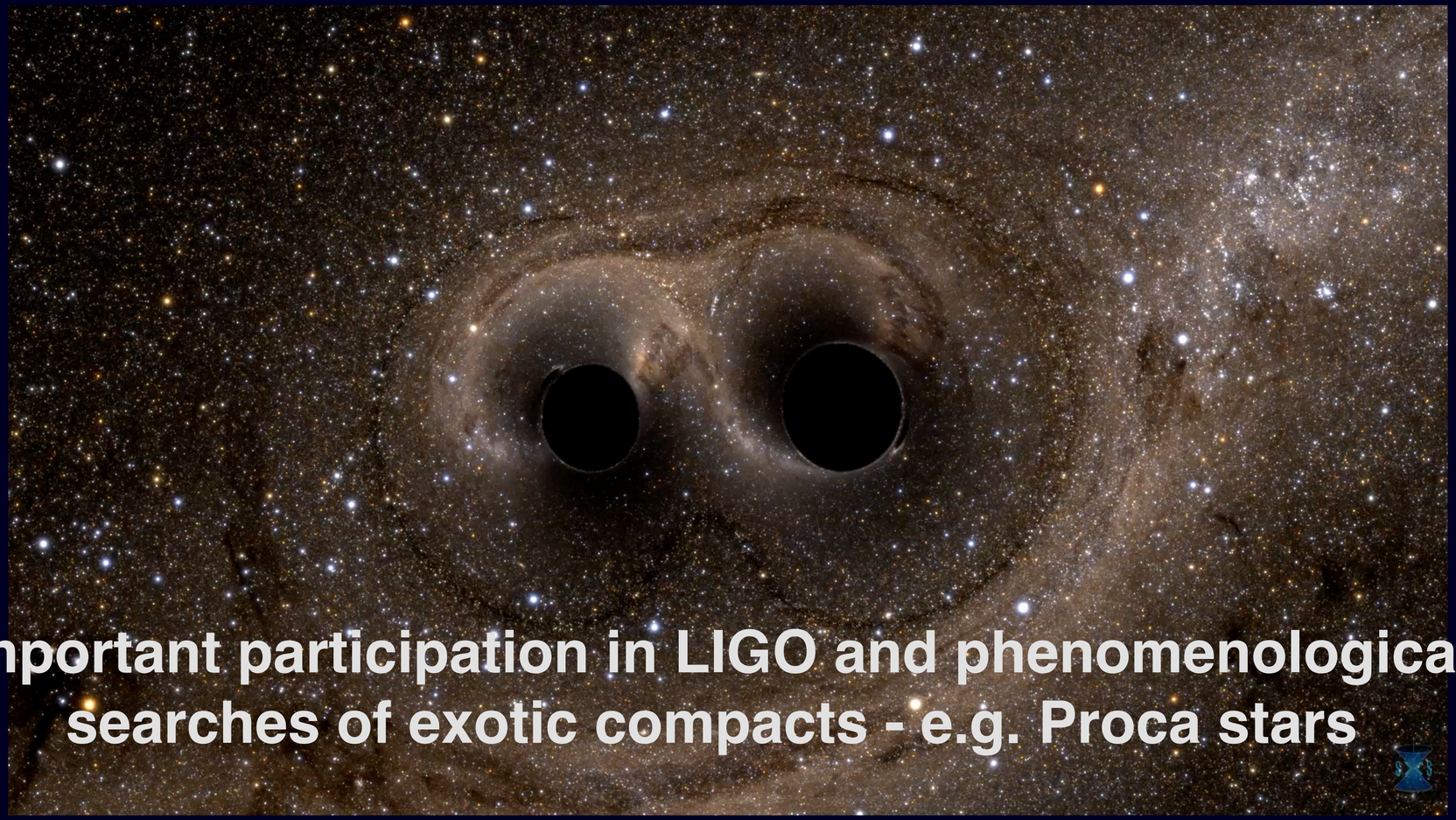

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SA2_GRWA — Gravitational waves

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SA2_NEXT — Dark matter and the nature of neutrinos

Installation of NEXT100 in Canfranc Underground Lab

First physics results on $0\nu\beta\beta$ exclusion with NEXT-white

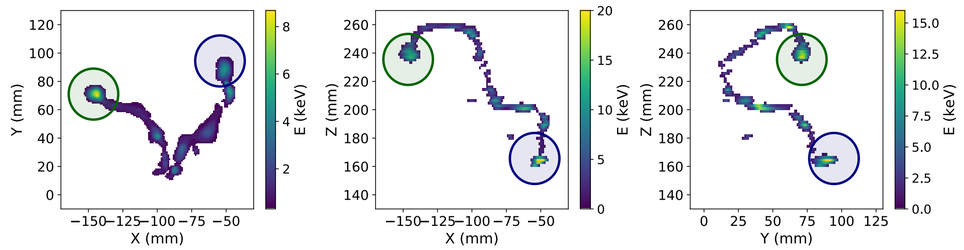
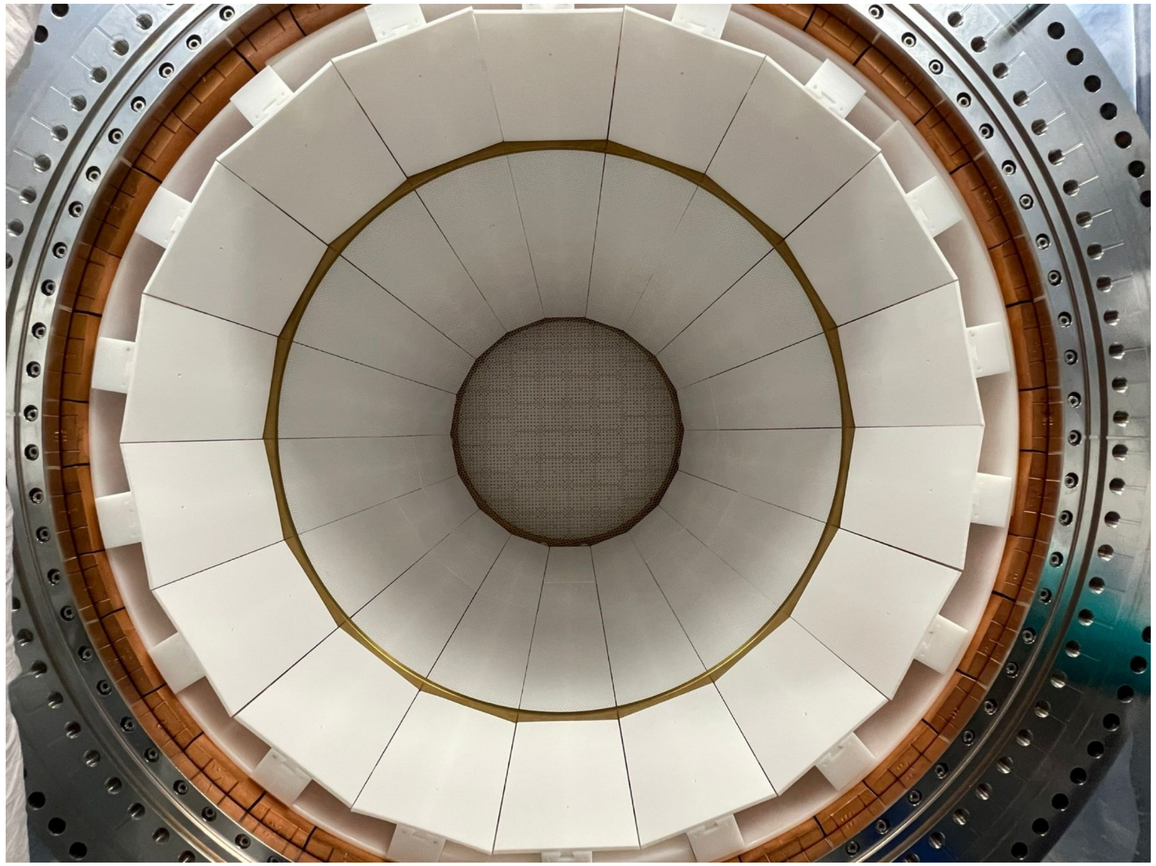


Figure 17. XY (left), XZ (middle), and YZ (right) projections of one of the $0\nu\beta\beta$ candidates. The energy of this event is 2.451 MeV, and its blob energies 0.538 MeV (green circle) and 0.449 MeV (blue circle). The event was detected the 14th of November 2020, at 21:35:53 (CET).

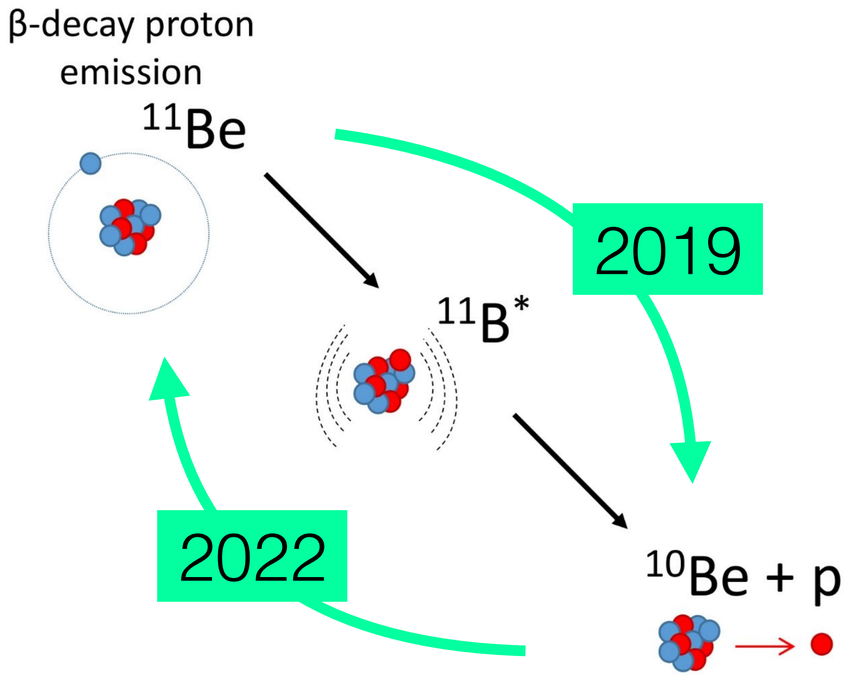


Growing participation in Hyper Kamionande

SA3_NULC — The structure of the nuclear many-body system



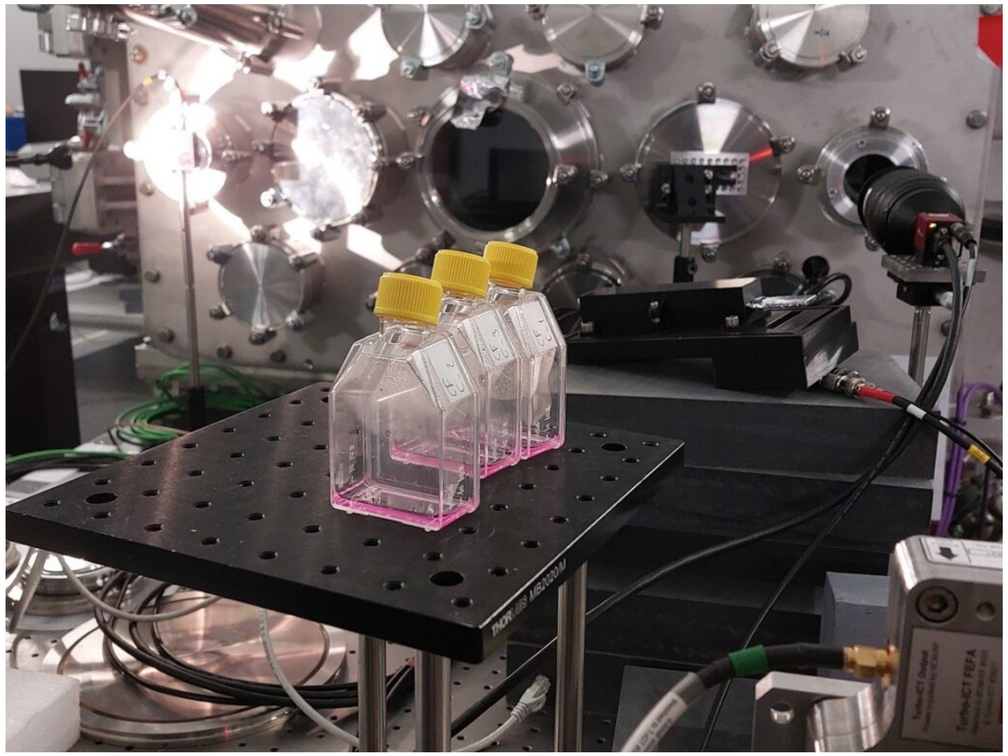




Optical TPC for fission and nuclear structure studies designed and mounted at IGFAE

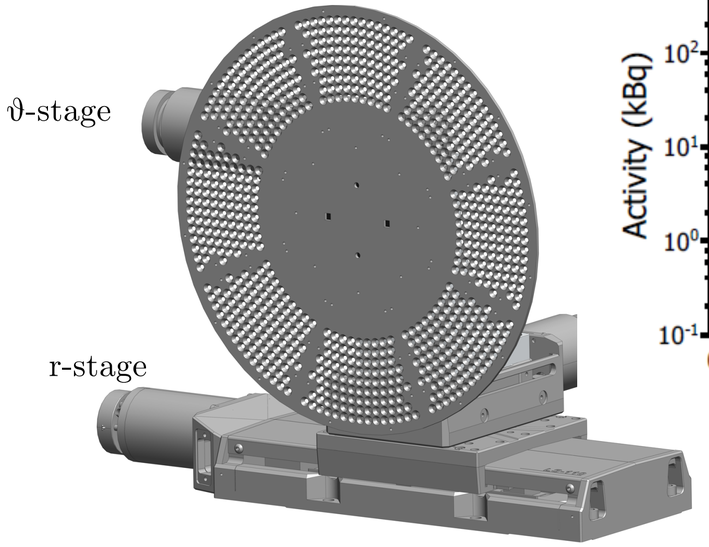
Evidence of a near-threshold resonance in 11B relevant to the β-delayed proton emission of 11Be.
Y. Ayyad et al. Phys. Rev. Lett. **129** (2022) 012501

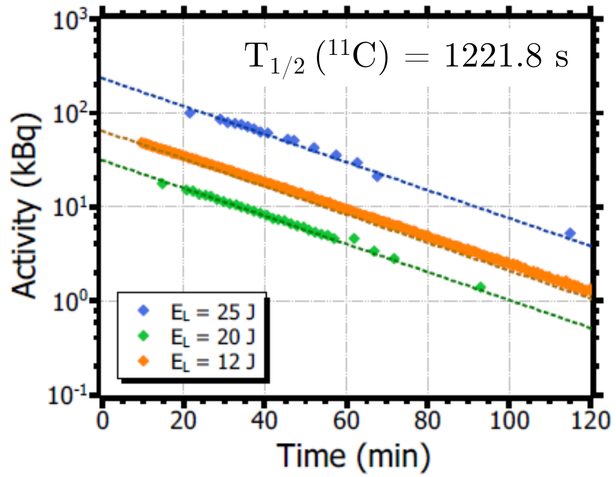
SA3_LACC — Laser Laboratory for Acceleration and Applications

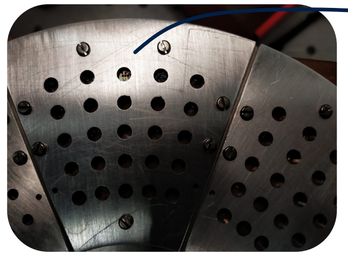


Towards flash radiotherapy by laser-accelerated protons

Production of 11C for PET imaging using a HRR laser-driven proton source





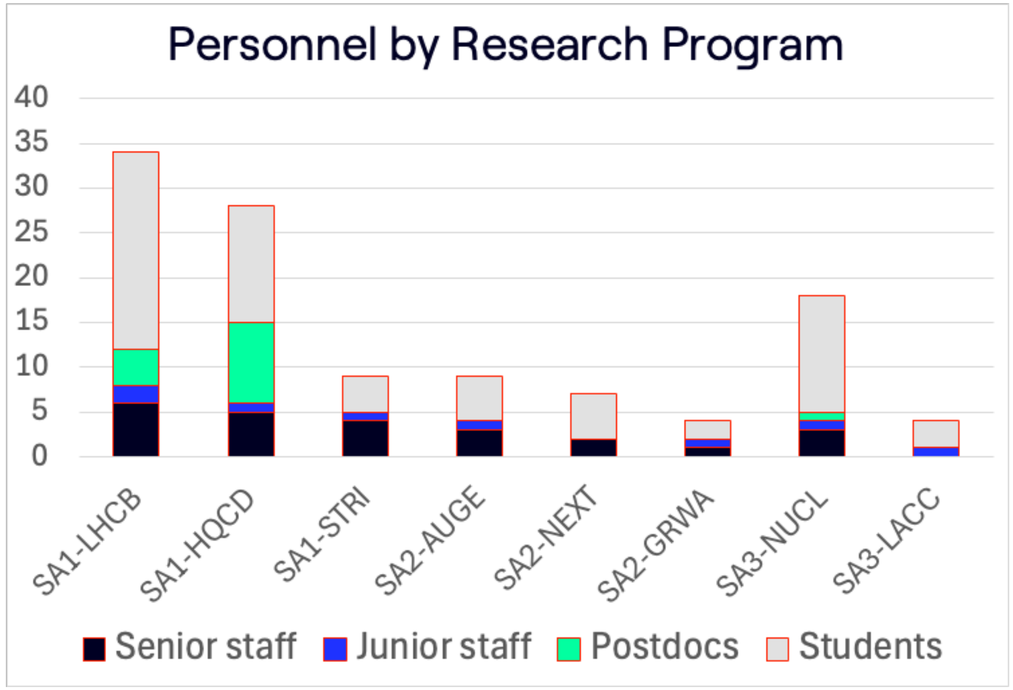


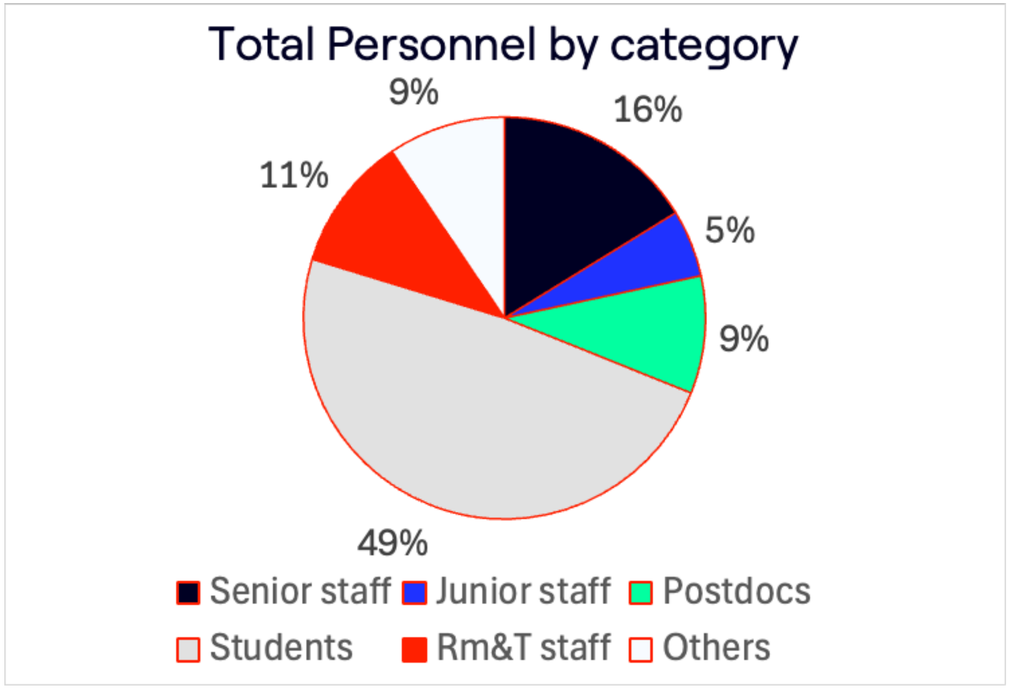
Target wheel for HRR

[J. Peñas *et al.*, HPLSE 12:2 (2024)]

People at IGFAE

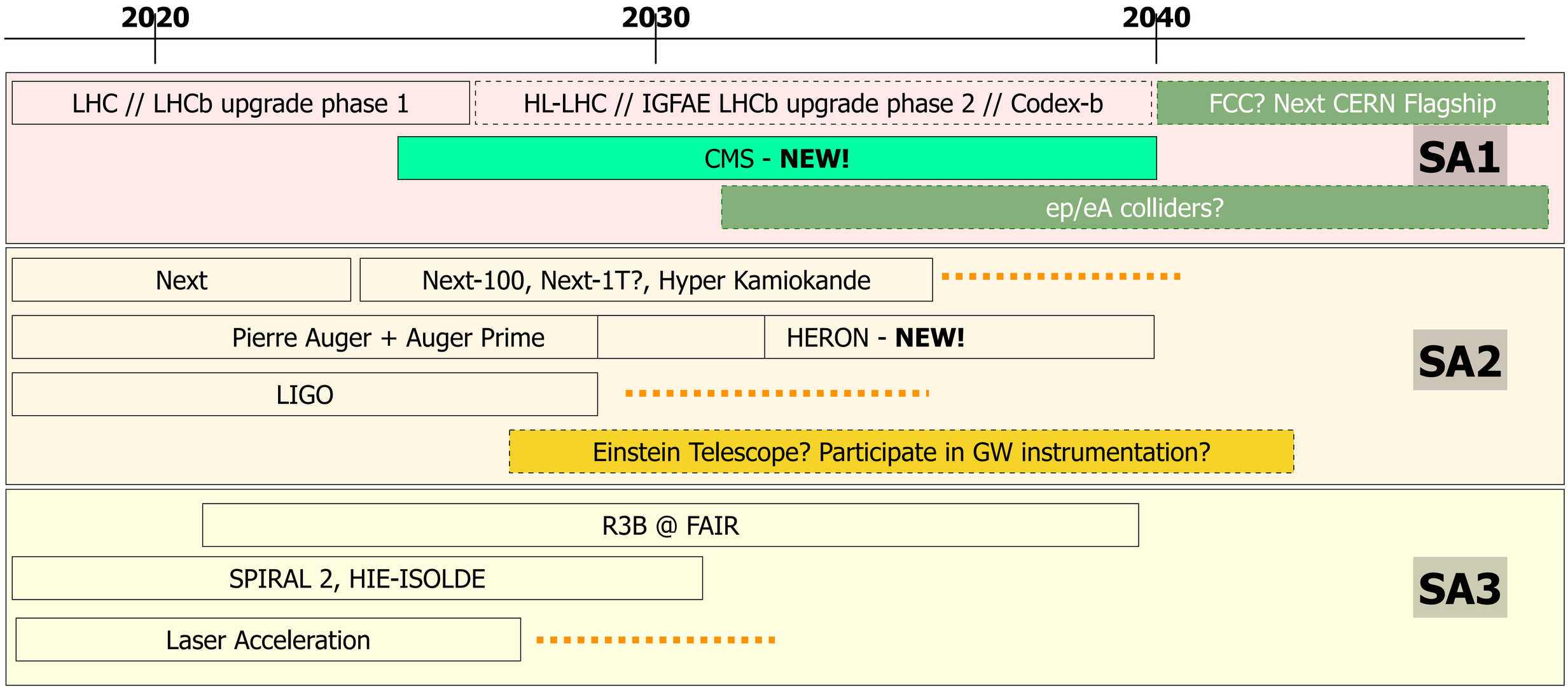
Total number of IGFAE members: 148





[Total number of IGFAE members almost doubled since first MdM in 2017]

Strategy for new facilities



ENJOY THE MEETING!