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Spanish national input to the European Strategy for Particle Physics

The LHC will continue to be the world's leading project in particle physics for the next two decades. Therefore, completing its high-luminosity upgrade and fully exploiting its physics programme must remain the top medium-term priority. The FCC project, including the initial electron-positron and subsequent hadron-hadron phases, has broad support across the Spanish community as the preferred next flagship facility at CERN. The community is committed to participating at all levels. This ambitious project, with its large overall physics potential, would strengthen Europe's leadership in the field, with CERN as the global reference laboratory. Should the FCC be unfeasible, the preferred alternative would be a linear electron-positron collider at CERN, starting with a Higgs factory stage and further upgrading it to reach the TeV scale.

Ensuring a diverse and comprehensive physics programme is crucial for addressing fundamental physics questions, including fixed-target, neutrino, flavour, astroparticle and nuclear physics experiments. CERN should continue supporting leading-edge projects through the Recognized Experiment status and international collaboration agreements.

A strong investment in accelerator R&D, along with the necessary advancements in detectors and computing, is essential for the success of future endeavours. Full implementation of the corresponding ECFA R&D roadmaps, prioritizing the required FCC developments and including environmental sustainability considerations, must be achieved. Additionally, continued theoretical advancements, particularly in high-order perturbative computations, non-perturbative studies and model-building, are crucial for future discoveries, with CERN remaining a key hub for collaboration and support.

An early decision on CERN's next flagship project is critical for our young researchers, and their involvement in the early stages would be highly beneficial. Effective communication and outreach will be essential for such an unprecedented endeavour as the FCC.

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