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The proposed ESS neutrino Super Beam and its physics case

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Searching for a difference between neutrino and anti-neutrino oscillations may open the way towards new fundamental physics and an explanation of why the world is made of only matter and no anti-matter. To discover such a difference, the development of a very large neutrino detector and a high-intensity neutrino beam is needed. The same detector will make possible investigations of cross-disciplinary phenomena like the energy generating processes in the Sun, the mechanism of Supernovae explosions and the radiogenic heating in the Earth's interior. The planned location of the neutrino detector, called GRIPnu, is in the Garpenberg mine ca 150 km north of Stockholm. The uniquely high-intensity ESS neutrino Super Beam will be generated using an upgraded ESS proton linac in Lund. Physicists from Sweden, France, Turkey, Spain, Greece, Italy, Croatia, Bulgaria, Poland, Switzerland and United Kingdom contribute to the EU H2020-supported Design Study of this neutrino research infrastructure and its physics case.

Summary

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