LABORATORI NAZIONALI DEL GRAN SASSO

LNGS Seminar series presents

NEUTRINO PARADIGM AND LHC

Colloquium by Goran Senjanovic

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I argue that the LHC may shed light on the nature of neutrino mass. The smoking gun signature is lepton number violation through the production of same sign lepton pairs, a collider analogue of the neutrinoless double beta decay. I discuss this in the context of Left-Right symmetric theories, which predicted neutrino mass long before experiment and led to the seesaw mechanism. A right-handed gauge boson with a mass in a few TeV region could easily dominate neutrinoless double beta decay, and its discovery at LHC would have spectacular signatures of parity restoration, lepton number violation and a unique direct proof of Majorana nature of heavy right-handed neutrinos. I also discuss the collider signatures of the three types of seesaw mechanism, and show how one could measure the PMNS mixing matrix at the LHC, complementing the low energy probes. Finally, time permitting, I give an example of a simple realistic SU(5) grand unified theory that predicts a seesaw with the weak fermion triplet at the LHC energies.

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