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SHIP: a new experiment proposal

The discovery of the Higgs boson represents a great success of the Standard Model. Nevertheless, there are still important unexplained phenomena like dark matter, the baryon asymmetry of the Universe and neutrino masses. The existence of three heavy neutral leptons with given characteristics could explain these open problems if two of them had masses of about 1 GeV and the third one of a few keV. SHIP (Search for Hidden Particles) is a new experiment proposal designed to search for the heavy neutral leptons in the GeV mass scale using a beam dump facility at CERN, able to access a region of the parameter space fully unexplored by any previous experiment. The beam dump facility is also the ideal tool to produce tau neutrinos and anti-neutrinos. So far OPERA has observed 4 events and DONUT 9, while the tau anti-neutrino has never been seen. SHIP is designed with an apparatus able to detect both the heavy neutral leptons through their decay products and tau neutrinos with different experimental techniques. It is also able to search for other particles foreseen in extensions of the Standard Model. We describe the physics potential of such an experiment.

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