LNGS SEMINAR SERIES

Maxim Yu. Khlopov

APC laboratory, Paris, France
& MEPHI, Moscow, Russia

Is it possible to save heavy stable neutrinos?

The existence of stable heavy neutrinos of 4th family with the mass around 50 GeV is strongly doubted in view of severe constraints from direct WIMP searches. However, one may avoid a trouble, if new family has new strict U(1) gauge interaction. In the charge symmetric case recombination of neutrinos and antineutrinos leads to their intensive binding and annihilation, reducing their abundance below the experimental limits. In the charge asymmetric case the excess of neutrinos is compensated by the excess of heavy stable anti-U quarks of 4th family. The latter form (antiU antiU antiU) stable -2 charged quark clusters with suppressed hadronic interaction, which binds by ordinary Coulomb force with primordial helium into the dominant nuclear interacting dark atoms of O-helium. Owing to new U(1) Coulomb like interaction the bulk of free 4th neutrinos recombine with O-helium, hiding their WIMP nature under helium shell of O-helium. The remaining fraction of free heavy neutrinos becomes within the experimental limits. A possibility to make the existence of 4th family fermions compatible with the experimental data on 125 GeV Higgs-like boson decay rates can be related with suppression of couplings of this boson to 4th family quarks and leptons owing to effects of extra heavy Higgs bosons, generating the dominant part of mass of these fermions.

NOVEMBER 17, 2015 - 12:00 AM
LNGS - "B. PONTECORVO" ROOM