

Collider and Cosmic ray search for stable multiple charged constituents of dark atoms

Thursday, 13 August 2020 11:25 (5 minutes)

Composite Higgs boson models can provide possible solution for SM problem of Higgs mass divergence and origin of electroweak symmetry breaking. Higgs boson constituents can bind in stable multiple charged particles (like technibaryons or technileptons in Walking Technicolor approach). Stable $-2n$ charged particles excess over their antiparticles results in formation of dark atoms in which such particles are bound with n He nuclei after BBN and which can play the role of a specific form of strongly interacting dark matter, which can provide solution for the puzzling contradiction in positive results of DAMA group and negative results of other experiments in direct underground search for dark matter. These multiple charged particles have no QCD interaction and thus have signatures of multiple charged stable leptons, offering new strategy for collider studies of dark matter. Accelerated in the Galaxy these particles will lead to specific type of Extensive Air Showers, challenging their search in LHAASO experiment. Combination of collider and cosmic ray studies can provide test for this hypothesis.

References:

- M.Yu.Khlopov. Dark atom solution for puzzles of direct dark matter searches. IOP Conf. Series: Journal of Physics: Conf. Series 1312 (2019) 012011; doi:10.1088/1742-6596/1312/1/012011
- M.Yu.Khlopov. Cosmoparticle physics of dark matter. EPJ Web of Conferences V. 222, 01006 (2019) Proceedings of QFTHEP2019. E-Print: arXiv:1910.12910; <https://doi.org/10.1051/epjconf/201922201006>
- M.Yu.Khlopov. Removing the conspiracy of BSM physics and BSM cosmology. International Journal of Modern Physics D Vol. 28 (2019) 1941012 (16 pages); DOI: 10.1142/S0218271819410128
- M.Yu.Khlopov Conspiracy of BSM physics and cosmology. Bled Workshops in Physics, V.20 PP.21-35 (2019) e-Print: arXiv:1911.03294.
- V.Beylin, M.Khlopov, V.Kuksa, N.Volchanskiy, Hadronic and Hadron-Like Physics of Dark Matter. Symmetry 11(4), 587 (2019); <https://doi.org/10.3390/sym11040587>. e-Print: arXiv:1904.12013.

Primary author: KHLOPOV, Maxim (APC/MEPHI/SFEDU)

Session Classification: Contributed ideas