

Search for sub-GeV dark sector particles with the NA64 experiment at the CERN SPS

The NA64 is a fixed-target experiment aiming to search for dark sector physics with a high-energy electron beam at the CERN SPS.

The experiment uses a new approach combining the active beam dump, missing energy techniques and hybrid decay particles detector.

We report on the search for invisible decays of a new gauge boson A' (dark photon) with sub-GeV mass and mixing with ordinary photon

which could transmit new, additional to gravity interaction between the ordinary matter and the dark sector.

The A' could also mediate

light thermal Dark Matter production. The results presented are based on the data collected in 2016 and corresponding to 4.3×10^{10} electrons on the active target.

We also report on the search for a new protophobic X boson. This particle with the mass 16.7 MeV could explain the anomalous excess

of e^+e^- pairs observed in the excited $^8\text{Be}^*$ nucleus decays. The bremsstrahlung X could be produced in the 100 GeV electron scattering

in the active high density dump and followed by its decay to e^+e^- pair. No such events were observed allowing to exclude part

of the X parameter space. New bound on the $A' \rightarrow e^+e^-$ decay for the mass range 1 - 22 MeV are also reported.

The obtained results are based on the data collected in 2017 with the NA64 apparatus in the visible decay mode configuration and

corresponding to 5.4×10^{10} electrons on the dump.

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