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Dark Sector Searches with the NA64 Experiment at CERN

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The existence of dark sectors is an exciting possibility to explain the origin of Dark Matter (DM). In particular, a class of phenomenological models assumes the existence of a vector portal, through which the dark sector and visible matter are related by a new force, in addition to gravity, transmitted by a light dark vector boson, A' (dark photon). Within this class of models, DM interacts with Standard Model (SM) particles through kinetic mixing of the A' with the SM photon, $\gamma - A'$, with a mixing strength $\epsilon \ll 1$. If A' exists, it could be produced through the kinetic mixing with a bremsstrahlung photon from a high-energy electron scattering in a target. A' could then decay invisibly into light DM particles, $A' \to \chi\chi$, or visibly, into e^+e^-. Searching for the former in events with large missing energy allows to probe the $\gamma - A'$ mixing strength and the parameter space close to the one predicted by the relic dark matter density. Motivation for searching visible decays has been recently enhanced by the anomaly observed in the ^{8}Be and ^{4}He nuclei transitions that could be explained by the existence of a 17 MeV boson also decaying into e^+e^-. In this talk, we present the latest NA64 results from the combined 2016-2018 data analysis for visible and invisible modes, and, with the end of the CERN long shutdown (LS2), the future prospects for the 2021 run. New recent results on axionlike and scalar particles searches produced though Primakoff reaction will also be discussed. Finally, with the recent announcement of the Fermilab latest result on the muon anomalous magnetic moment, prospects in the search for dark sectors weakly coupled to muon through the NA64 muon program, recently approved, will be presented.

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