



Contribution ID: 331

Type: **Talk**

Dark sector searches with NA64 experiment at CERN

Wednesday 8 September 2021 16:04 (18 minutes)

The existence of dark sectors is an exciting possibility to explain the origin of Dark Matter (DM). In addition to gravity, DM could interact with ordinary matter through a new very weak force. This new interaction could be mediated by a new massive vector boson, called dark photon (A'). 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, $A' \rightarrow \chi\chi$, or visibly, into e^+e^- . Searching for the former in events with large missing energy allows us to probe the γ - 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 8Be and 4He 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 the future prospects in 2021. New recent results on axionlike and scalar particles searches produced through Primakoff reaction will also be discussed. Finally, the new NA64 muon program, exploring dark sectors weakly coupled to muons will also be presented.

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Session Classification: Dark matter and cosmology

Track Classification: Dark matter and cosmology