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1 NA64 SEARCHING FOR HIDDEN SECTORS AT THE CERN SPS

NA64 is a fixed target experiment at the CERN SPS aiming at a sensitive search for hidden sectors. In this talk, we will present our latest results on the search for a new sub-GeV vector gauge boson (A) mediated dark matter (χ) production. The A , called dark photon, could be generated in the reaction $eZ \rightarrow eZA$ of 100 GeV electrons dumped against an active target which is followed by the prompt invisible decay $A \rightarrow \chi\chi$. The experimental signature of this process would be a clean event with an isolated electron and large missing energy in the detector. This allows us to set new limits on the A mixing strength and constrain the new parameter space for the most interesting light dark matter models. The latest NA64 results set new limits on the scalar/axion like particles (ALP) photon coupling strength, in a phase-space that closes the gap in the ALP parameter space between previous fixed target and collider experiments. Results on the search for the visible $A' \rightarrow e+e$ decays, as well as $X \rightarrow e+e$ decay of a new 17 MeV X boson, which could explain a recently observed anomaly in the 8Be transitions will be also discussed. Finally, a new setup designed to cover this anomaly completely in the next beam time is briefly presented.