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Light Dark Gauge Boson Searches in Electron-Proton Scattering: Description of Present Data and Simulation for Future Experiments

Tuesday, 16 October 2012 12:00 (35 minutes)

We study the exploration reach of various fixed target experiments searching for the dark photon. Therefore we investigate the creation of a lepton pair induced by quasi elastic scattering of an electron beam off a heavy nucleus (A,Z), i.e. e(A,Z) -> e (A,Z) e^+e^- with a dark photon A' as signal and a virtual photon as background in the intermediate state.
We present our calculations in comparison with the data taken in the 2011 test runs of the MAMI dark photon experiment at Mainz and the APEX experiment at Jefferson Lab and prove the extracted exclusion limits on the kinetic mixing factor, describing the coupling strength of A' to leptons. Predictions of the expected exclusion limits of the 2012 beam time at MAMI will be presented. Furthermore estimates for the reach of the HPS and DarkLight experiments at Jefferson Lab and for the planned MESA facility at Mainz will be given.

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