

Dark sector searches at Jefferson Laboratory

The nature of Dark Matter is one of the prominent open-questions in physics at present: although gravitational observations prove that matter in our Universe is mainly made of DM, very little is known about it. While most of “traditional” DM experiments are designed and optimized to probe the weak-force mass scale, $O(100 \text{ GeV})$, the light DM

(LDM) region, $O(10 \text{ MeV} - 1 \text{ GeV})$ is, so far, almost unexplored. This hypothesis is a compelling possibility for new physics, and a rich experimental program is currently being proposed and developed to investigate it.

The Jefferson Laboratory community joined this program with different, complementary efforts. The APEX, HPS, and DarkLight experiments are searching for a possible $U(1)$ force-mediator between the dark sector and SM, the “dark photon” or A' . These experiments look for the visible dark photon decay to SM particles, mainly in the $A' \rightarrow e^+e^-$ channel.

The BDX experiment, instead, is a beam-dump experiment looking directly for the LDM scattering on a detector, resulting in a visible energy release.

In the talk, I'll discuss in details these efforts, showing the different experimental approaches and presenting the current status and the foreseen results.

Summary

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