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Probing (ultra-) light Dark Matter Using Mössbauer Spectroscopy

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We explore the possibility of probing (ultra-)light dark matter (DM) using Mössbauer spectroscopy technique. Due to the time-oscillating DM background, a small shift in the emitted photon energy is produced, which in turn can be tested by the absorption spectrum. As the DM induced effect (signal) depends on the distance between the Mössbauer emitter and the absorber, this allows us to probe DM mass inverse of the order of the macroscopic distance scales. By using the existing synchrotron based Mössbauer setup, we can probe DM parameter space which is at par with the bounds from various fifth force experiments. We show our method can improve the existing limits coming from experiments looking for oscillating nature of DM, by several orders of magnitude. An advancement of the synchrotron facilities would enable us to probe DM parameter space beyond the fifth force limit by several orders of magnitude.

Mini Symposia (Invited Talks Only)

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