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Many-body atomic response functions for sub-GeV dark matter-electron interactions

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Direct searches of sub-GeV light dark matter (LDM) in our galaxy through its interactions with electrons has been a rapidly-growing area. As the kinetic energy of such a LDM particle is generally below keV, its scattering triggers sub-keV electronic recoils in detectors, and a proper understanding of these events usually requires reliable many-body theory inputs.

In this talk, we present a comprehensive data set of atomic response functions for xenon and germanium with 12.2 and 80 eV energy thresholds, respectively. Our approach, the multiconfiguration relativistic random phase approximation, takes into account the relativistic, exchange, and correlation effects in one self-consistent framework; and is benchmarked by photoabsorption data from thresholds to 30 keV with errors less than 5%. The significance of these effects and the importance of the benchmark will be discussed.

Collaboration you are representing

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