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Absorption of dark matter particles in atoms via a Migdal-type effect

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The Migdal effect describes the ionization rate of atoms during the scattering of heavy particles off atomic nuclei. It offers a new avenue for the search for dark matter particles with sub-GeV masses in liquid noble gas detectors. We propose a novel mechanism for atomic ionization, involving the complete absorption of dark matter particles upon interaction with atomic nuclei. Unlike inelastic dark matter scattering, this process transfers the particle's entire energy, including its rest mass (mc^2 term), to the electron. This approach enables the search for scalar dark matter particles with masses ranging from 1 to 100 keV using the same detectors, assuming these particles exhibit Yukawa-type interactions with nucleons.

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