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Searching for super-WIMPs in leptonic heavy meson decays

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Abstract:

We study constraints on the models of bosonic super-weakly interacting particle (super-WIMP) dark matter (DM) with DM masses $m_X \sim \mathcal{O}(1-100)$ keV from leptonic decays $M \rightarrow \ell \bar{\nu}_\ell + X$, where $M = B^\pm, D^\pm, D_s^\pm$ is a heavy meson state. We focus on two cases where X denotes either a light pseudoscalar (axion-like), or a light vector state that couples to the standard model (SM) through kinetic mixing. We note that for a small DM mass these decays are separately sensitive to DM couplings to quarks, but not its mass.

Author: YECHAN GUNJA, Aditya (W)

Co-authors: PETROV, Alexey (Wayne State University); HEALEY, Kristopher (Wayne State University)

Presenter: YECHAN GUNJA, Aditya (W)

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