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Ultra-high-energy neutrinos to look for super-heavy dark matter inside Earth

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As the Earth travels across the Milky Way, it passes through the galactic halo of dark matter particles. Occasionally a dark matter particle could interact with the contents of the earth, scattering it to a lower energy, which can lead to it becoming gravitationally trapped inside the Earth. If these dark matter particles are self-annihilating, or decay, one possible final state product will be neutrinos, which would lead to a flux of neutrinos at the surface of the earth, coming from dark matter, thus enabling indirect dark matter detection. The work focuses on the specific case of super-heavy dark matter in the mass range $1e7$ GeV to $1e9$ GeV, and explores the possibility of detecting ultra-high-energy neutrinos in the planned IceCube-Gen2 detector, in the hopes that data in the next 10–15 years can either discover or set new limits on dark matter.

Author: VOSS JACOBSEN, Johannes

Co-author: BUSTAMANTE, Mauricio (Niels Bohr Institute, University of Copenhagen)

Presenter: VOSS JACOBSEN, Johannes

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