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## Upscattering Inelastic Dark Matter in the Earth

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There are many possible reasons that we have not yet detected dark matter: it could be very weakly interacting, too light to trigger conventional detectors, or very massive and thus rare. But another possibility is that dark matter may scatter predominantly inelastically with Standard Model particles. In a typical model, elastic scattering is absent at tree level, and a relatively light dark matter state must upscatter into a heavier state in order to interact at all. This introduces an energy threshold for scattering in a detector. In this talk, I will discuss the excitation of inelastic dark matter in the Earth, followed by its downscattering inside a detector. Considering this process substantially extends the sensitivity of existing detectors to inelastic dark matter, in a way that relies only on scattering with nuclei. I will present new limits on inelastic dark matter based on XENON100 and XENON1T data, which extend to significantly larger mass splittings than previous bounds based on these experiments.

**Presenters:** CAPPIELLO, Christopher; CAPPIELLO, Christopher **Session Classification:** Wednesday Afternoon Session 2