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Dark matter annual modulation with SABRE

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The interaction rate of hypothesized dark matter particles in an Earth bound detector is expected to undergo an annual modulation due to the planet's orbital motion. The DAMA experiment has observed such a modulation with high significance in an array of scintillating NaI(Tl) crystals, however this results demands a model independent verification.

SABRE aims to perform a higher sensitivity measurement with NaI(Tl) crystals able to clarify the claim, but also to investigate the nature of dark matter interaction and the characteristics of the halo. SABRE will have a lower background in the signal region and a lower energy threshold thanks to high purity crystals and a 4π active background rejection with liquid scintillator. We present here the progresses ongoing in the construction of the Proof-of-Principle phase at LNGS (Laboratori Nazionali del Gran Sasso, Italy), our future design including a pair of twin detectors at LNGS and SUPL (Stawell Underground Physics Laboratory, Australia) and we detail the background and the sensitivity to dark matter interaction that we anticipate.

Primary author: D'ANGELO, Davide (Universita' degli Studi Milano)

Presenter: Dr BIGNELL, Lindsey

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