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# Constraints on ultralight dark matter with the European Pulsar Timing Array

*Wednesday, 9 October 2024 10:45 (30 minutes)*

Pulsar Timing Array experiments can probe the presence of possible scalar or pseudoscalar ultralight dark matter particles through decade-long timing of an ensemble of galactic millisecond radio pulsars. If dark matter interacts only gravitationally with ordinary baryonic matter, our findings show that ultralight particles with masses $10^{-24.0}$ eV $\leq$ m $\leq 10^{-23.3}$ eV can have at most local density $\rho \leq 0.3$ GeV/cm$^3$. A conformal coupling of the dark matter scalar to gravity, instead, would mediate an effective coupling between pulsars and dark matter. In turn, this would produce a periodic modulation of the pulsar rotational frequency. We present constraints on the coupling of dark matter, improving on existing bounds.

**Primary author:** SMARRA, Clemente (SISSA)

**Presenter:** SMARRA, Clemente (SISSA)

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