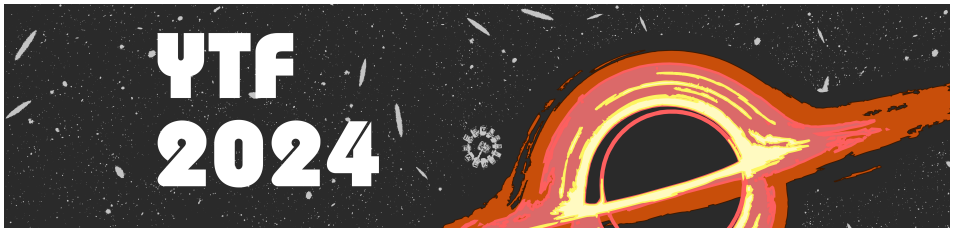

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Axion-photon conversion from Neutron star populations

Thursday 19 December 2024 12:00 (30 minutes)

The QCD axion, a favourable candidate for dark matter and a solution to the strong CP problem, can efficiently convert into photons in the presence of high magnetic fields. Neutron stars harbour high magnetic fields ($\approx 10^{12}$ G) and serve as powerful probes to search for axion-photon conversion via observation of radio emission at the axion frequency $\hbar\omega = m_a c^2$, with m_a the axion mass. The non-observation of signals currently places upper limits on the axion-photon coupling. Recently, much discussion has arisen about the efficient modelling of the neutron star population in the galaxy and a comparison between a 'single star observation'vs. a 'population'type observational approach. In our current work, I (with my collaborators) tackled these issues and used PsrPopPy, a Python-based package for modelling neutron stars in the galaxy and estimated the axion-photon signal from the galactic population. We provide the pros and cons of conducting a population analysis over a single-star analysis both for existing constraints and future MeerKAT and SKA observations.

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