

NITheCS Colloquium

Monday, 5 September 2022, 16h00 – 17h00 SAST
Prof Yin-Zhe Ma (University of KwaZulu-Natal)

‘Using South Africa’s MeerKAT to constrain Axion dark matter’

ABSTRACT



Dark matter is the dominant matter in the Universe. A compelling dark matter candidate of increasing scientific interests in recent years is Axion, which was originally postulated to solve the strong CP problem in particle physics. Axions can be converted into monochromatic radiation in the neutron star’s magnetosphere, constituting a unique window to probe its existence with a radio telescope. In 2020’s MeerKAT open-call for proposal, we were granted 10 hours of observation time. We completed the observations towards the isolated neutron star RX J0806.4-4123 in the UHF band in 2021. In this talk, I will present the results of the constraints on Axion DM decay rate from the newly observed MeerKAT data. I will show that the (new) upper limit of the axion decay constant is in the mass range of 2.5-5 $\mu\text{-eV}$ (micro-Electronvolt), which corresponds to MeerKAT 544-1,088 MHz. The constraints from MeerKAT complements the laboratory-based axion dark matter searches and fills the gap between 810-1,090 MHz gap between ADMX and RBF experiments. I will also discuss the future prospects of MeerKAT potential for Axion search.

BIOGRAPHY

Prof Yin-Zhe Ma obtained his PhD degree in Astronomy from the University of Cambridge (supervisor: Prof George Efstathiou FRS).

He conducted CITA National Fellowship at the University of British Columbia, Canada, and was a research associate at the University of Manchester before moving to the University of KwaZulu-Natal as a senior lecturer (2015-2017), an associate professor (2018-2021) and a full professor (2021-).

He leads and chairs the South Africa and China collaboration. His main research is on cosmology.

He is currently a core member of the Square Kilometre Array (SKA) team, Hydrogen Epoch Reionization Array (HERA), MeerKAT large survey team, and Rubin Observatory (LSST).

He also participated in the Planck satellite science team and the Six-degree-Field Galaxy Survey.

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