Contribution ID: **9** Type: **Research Talk**

Addressing Challenges in Pulsar Science in the Era of Multi-messenger Astronomy

Monday 24 April 2023 16:00 (45 minutes)

The last few years have seen the birth of in multi-messenger astronomy. Two prominent publications initiated the field: the first described the concurrent discovery of gravitational waves (GW170817) and a gamma-ray burst (GRB 170817A) linked to the binary neutron star merger event; the second claimed the association of the blazar TXS 0506+056 as the source of extremely-high-energy neutrinos detected by IceCube, in addition to it being a source of very-high energy gamma rays as observed by H.E.S.S. Locally, astronomers have been hard at work to establish strong collaborations between astronomical facilities in the different wavebands: gamma rays (H.E.S.S.), optical (SALT), and radio (MeerKAT). Additional wavebands are accessible via archival data repositories of gamma rays (Fermi LAT) and X-rays (XMM-Newton, NICER, NuSTAR, Chandra). Within this dynamic field, our group's work has centred on modelling pulsars and pulsar-related systems: we study particles and photons from isolated and binary pulsars, pulsar wind nebulae, and pulsars in globular clusters. We have also branched out into radio science, successfully obtaining time on the MeerKAT radio telescope to search for persistent radio emission surrounding fast radio bursts (FRBs). The latter are probably linked to magnetars, which are highly magnetic pulsars. We have also embarked on radio pulsar searches in nearby galaxies using MeerKAT. Many challenges and unanswered questions remain, with precision data providing opportunities to test and fine-tune sophisticated pulsar models that have strong computational requirements. Cross-disciplinary research invoking quantum information technologies (QITs) to increase computational and classification capabilities is a promising avenue. I will review our pulsar modelling research, and explore some ideas where QIT may aid this fascinating work.Write your abstract here

Primary author: Prof. VENTER, Christo (NWU)

Presenter: Prof. VENTER, Christo (NWU)

Session Classification: Research Talk 3: QIT/ML/Neutrinos/Astrophysics/Cosmology

Track Classification: Quantum Information