

Proposal for old NS population studies with SKA for determining FRB-QN rates

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Abstract

Fast radio bursts (FRBs) are millisecond duration radio pulses of seemingly unknown origin. One model that correctly predicts these millisecond pulses is that of neutron star (NS) death via quark nova (QN). In this process, the core of an old neutron star (that has finally lost enough energy through the spin-down mechanism) will reach a density capable of causing colour deconfinement. An explosion is triggered that ejects a neutron-rich sphere that produces r-process heavy unstable nuclei. When the ejecta reaches the light cylinder (LC) of the parent neutron star, β -decay occurs and the electrons yielded from this produce synchrotron emission as they move along the magnetic field lines here. In order to determine the likelihood of emission at different frequencies from the FRB-QN model, we suggest a detailed survey of old NS population studies with the Square Kilometre Array (SKA). The model will be better supported by a study that determines what the local galactic population of old neutron stars is since this will help determine the rate of FRB-QN events.

References

- [1] Zachary Shand *et al* 2016. *Res. Astronom. Astrophys.* **16** 080