

Transients in Middle Earth



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Fast Radio Bursts and Interstellar Objects

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Fast radio bursts (FRBs) are transient radio events with millisecond-scale durations and debated origins. Collisions between planetesimals and neutron stars are one proposed mechanism to produce FRB-like signals, with the planetesimal's strength, size and density determining the time duration and energy of the resulting event. One under-explored source of these planetesimals is the free-floating population of interstellar objects, expected to be extremely abundant in galaxies across the Universe as ubiquitous products of planetary formation.

We investigate ISO-neutron star collisions as a source of FRBs, and predict that the collision rate is comparable with the observed FRB event rate. Using a model linking the properties of planetesimals and the FRBs they produce, we further show that observed FRB durations are consistent with the sizes of known ISOs, and the FRB energy distribution is consistent with the observed size distributions of Solar System planetesimal populations. Finally, we argue that the rate of ISO-neutron star collisions must increase with cosmic time, matching the observed evolution of the FRB rate. Thus, ISO-neutron star collisions are a feasible origin of FRBs.

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