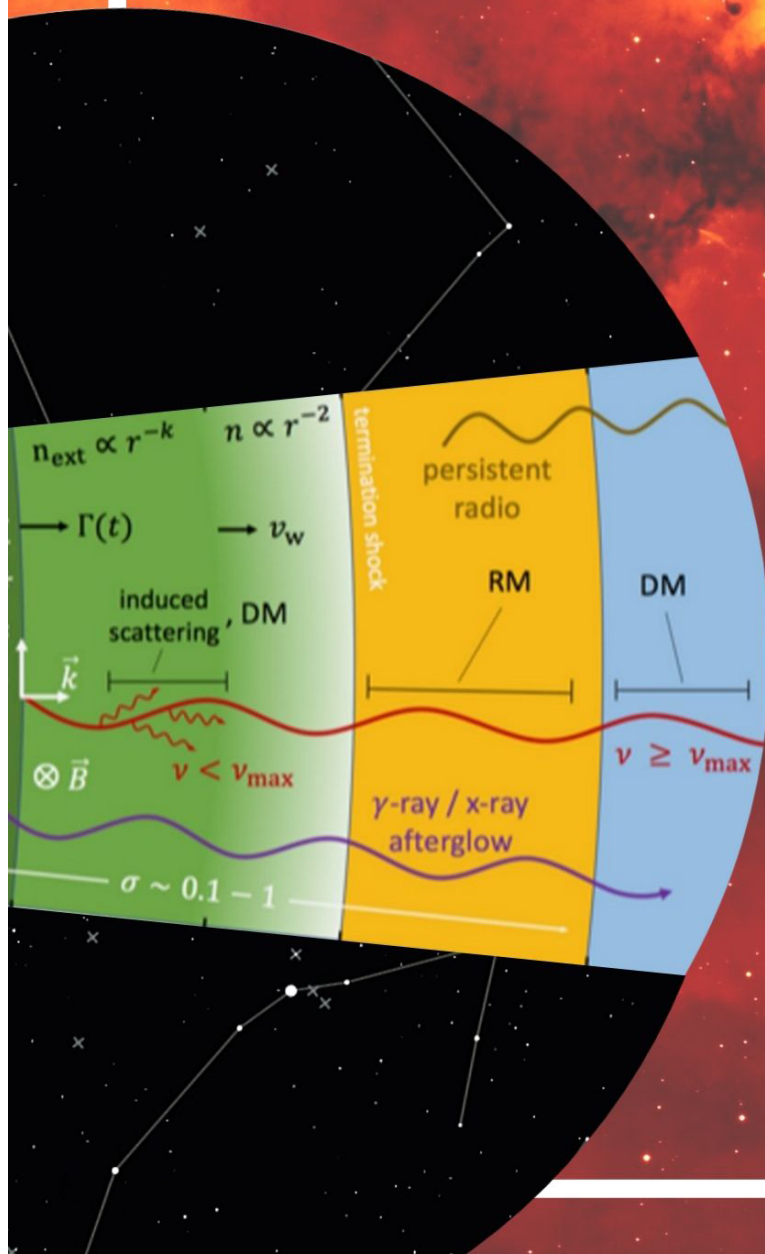


ASTROPHYSICS SEMINAR SERIES

Deciphering the Engines of Fast Radio Bursts

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Fast radio bursts (FRB) are luminous coherent pulses of radio emission lasting a few milliseconds or less, which likely originate from cosmological distances. Some FRBs are observed to repeat, but it is presently unclear whether they all do so, and there is tentative but growing evidence diverse formation channels from the small sample of FRBs with host galaxy associations. I will overview efforts to understand the engines, emission mechanisms, and environments of FRB engines in light of the rapidly expanding sample of bursts by CHIME and other surveys. I will argue that FRBs can be understood as coherent synchrotron maser emission from an ultra-relativistic blast wave created by the impulsive injection of energy from the central engine into a dense magnetized environment on \sim AU scales surrounding the source, the external medium itself likely to be matter released from earlier flares. This model can quantitatively explain many properties of the first (and most well-studied) repeater FRB121102, including the downward drift seen in the burst frequency structure generated as the blast wave sweeps up mass and decelerates. The most likely engines, responsible for powering the majority of FRBs, are young (decades to centuries old) flaring magnetized neutron stars ("magnetars") caught at particularly young, hyper-active stages in their lives. However, the mechanism I will overview is generic and could produce FRBs from a wide variety of astrophysical events involving energetic relativistic explosions into a magnetized medium.



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