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Probing the Origins of Fast Radio Bursts

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Fast Radio Bursts (FRBs) are mysterious radio transients that occur at a prodigious rate of $\approx 10^3$ events per day above fluences of 1 Jansky-ms in the entire sky. Arriving from cosmological distances (\sim Gpc), FRBs show potential to be novel probes of cosmological parameters, the ionized baryon distribution, and the magnetic fields around and between galaxies. We do not know the origins of these bursts, which intrinsically seem to be $\sim 10^{12}$ times more luminous than pulsar radio signals that they resemble. A plethora of FRB models have been proposed but the tests of these models are observationally limited by the small heterogeneously assembled sample of FRBs. However, the FRB population is now poised for an explosion with many large surveys starting observations allowing real-time detection, multi-wavelength follow up and the generation of a large, well-understood sample of FRBs. I will summarize the new results and recent advances in our understanding of FRBs, discuss the open questions about FRBs and the challenges of addressing them.