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Probing the repetition of fast radio bursts with CHIME and LOFAR

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Fast radio bursts (FRBs) are extragalactic radio transients of microsecond to millisecond duration, whose physical origin is largely unknown. Some FRBs are known to repeat, which rules out cataclysmic progenitor models for these sources. Repeating FRBs exhibit significantly different temporal widths and bandwidths as compared to the non-repeating sources. A potential explanation for these differences is that repeaters and non-repeaters have different progenitors. In this talk, I will present a study of a new sample of repeating FRBs discovered with the Canadian Hydrogen Intensity Mapping Experiment telescope (CHIME) in the frequency range of 400-800 MHz. While some repeating sources have anomalously high repetition rates, we find no clear bi-modality between the repetition rates of repeaters and the upper limits on repetition from previously discovered non-repeating sources. This argues against repeaters and non-repeaters belonging to fundamentally different source classes. We further study the frequency dependence of the measured repetition rates by searching archival observations made with the Low Frequency Array (LOFAR) telescope at the location of 45 known repeating sources and 460 apparent non-repeaters. These observations were conducted as part of the LOFAR Tied-Array All-sky Survey (LOTAAS) in the frequency range of 119-151 MHz. I will report on the results of this search and discuss resulting constraints on the frequency dependence of FRB repetition and their implications for the emission mechanism and circum-burst environments of FRBs.

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