A fast radio burst with a low dispersion measure

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statistically confirmed, this relation will be used to (i) constrain the mechanisms powering GRB jets, (ii) estimate GRB distances, (iii) probe the early Universe, and (iv) constrain the cosmological parameters. I will present this new unified model using analysis of GRBs detected with various observatories and instruments such as Fermi, CGRO/BATSE and the combination of the three instruments onboard Swift and Suzaku/WAM. I will discuss here the striking similarities of GRB spectral shapes, whose components inform on the nature of the prompt emission, as well as the possible universality of the proposed luminosity/hardness relation in the context of our new model.

107.04D — Multi-Telescope Radio Observations for Low-Frequency Gravitational Wave Astrophysics

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The North American Nanohertz Observatory for Gravitational Waves (NANOGrav) has the principal goal of detecting gravitational waves (GWs) using pulsar timing. This thesis presents results from radio campaigns at frequencies from 322 MHz to 10 GHz aimed at both multi-messenger constraints on GW sources and improving timing sensitivity. The primary expected source of GWs at the nanohertz frequencies to which pulsar timing is sensitive are supermassive black hole (SMBH) binaries. We investigate a purported SMBH displaced from the galactic photocenter in NGC 3115. We explore the possibilities that the source is a SMBH binary or a post-merger recoiling SMBH. We place constraints on a possible SMBH companion using observations taken with the NRAO Very Large Array. If a companion can be confirmed, this system could be a future GW source detectable with pulsar timing. To detect such sources, our pulsar timing array must be as sensitive as possible, requiring the mitigation of all other astrophysical timing delays, including those from the interstellar medium (ISM). Using wideband multi-frequency observations obtained with the Green Bank Telescope and Arecibo Observatory, we characterize frequency-dependent dispersion, quantified by the dispersion measure (DM). We analyze trends in the DM time series, propose sources of these trends, and identify timescales over which the DM varies beyond measurement errors and therefore can no longer be modeled as constant in timing. Analyzing DM variations aids in characterizing properties of the ISM and informs our timing observation strategy. Multi-telescope observations around the globe and at complementary frequencies can be used to more sensitively constrain DMs. We compare DMs measured with simultaneous dual-frequency observations obtained with the Giant Metrewave Radio Telescope (GMRT) to those calculated in the NANOGrav 11-year data release to assess the possible precision of frequency-dependent noise measurements with the GMRT. We discuss the possibility of incorporating the GMRT into international pulsar timing efforts and the anticipated challenges in future data combination.

107.05 — A fast radio burst with a low dispersion measure

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Fast radio bursts (FRBs) are millisecond pulses of radio emission of seemingly extragalactic origin. More than 35 FRBs have now been detected, with only one seen to repeat. Here we present a new FRB discovery, FRB 110214, which was detected in the high latitude portion of the High Time Resolution Universe South survey at the Parkes telescope. FRB 110214 has one of the lowest dispersion measures of any known FRB (DM = 168.9$
pm$0.5 pc cm$[-3]$), and was detected in two beams of the Parkes multi-beam receiver. A triangulation of the burst origin on the sky identified three possible regions in the beam pattern where it may have originated, all in sidelobes of the primary detection beam. Depending on the true location of the burst the intrinsic fluence is estimated to fall in the range of 50 $-$ 2000 Jy ms, making FRB 110214 one of the highest-fluence FRBs detected to date. No repeating pulses were seen in almost 100 hours of follow-up observations with the Parkes telescope down to a limiting fluence of 0.3 Jy ms for a 2-ms pulse. Similar low-DM, ultra-bright FRBs may be detected in telescope sidelobes in the future, making careful modeling of multi-beam instrument beam patterns of utmost importance for upcoming FRB surveys.

107.06 — Numerical General Relativistic MHD With Magnetically Polarized Matter

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The magnetically polarized matter in astrophysical