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The Radio to GeV Afterglow of GRB 221009A: Observations and Multi-wavelength Modeling

Thursday, 5 October 2023 10:00 (30 minutes)

As the most energetic explosions in the Universe, long-duration Gamma-ray Bursts (GRBs) provide a unique opportunity to explore physics at extreme energy scales that are otherwise impossible to investigate in Earth-bound laboratories. The radiation produced by the interaction of their ejecta with the environment contains clues to their progenitors and to the mechanisms responsible for producing and collimating their relativistic jets. Whereas this radiation has traditionally been interpreted in the framework of synchrotron radiation from relativistic shocks, the discovery of VHE gamma-rays from GRBs complicates this model.

The recent bright, nearby GRB 221009A provides an excellent opportunity to test our understanding of processes responsible for GRB afterglow radiation. I will summarize our understanding of this path-breaking event with a special emphasis on new insight from radio observations, which reveal unexpected and unusual spectral and temporal evolution. I will combine our radio data with optical to GeV observations to explore the jet physics of this remarkable explosion. I will conclude with a discussion of the role of radio observations and modeling in GRB science, highlighting the current and future role of radio observations in the ongoing multi-messenger revolution in extragalactic time-domain astrophysics.

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Session Classification: Multimessenger view of neutron stars: from pulsars to GRBs