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Radio Polarimetry of GRB Afterglows

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As the most energetic explosions in the Universe, relativistic astrophysical transients such as 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. I will demonstrate the power of radio polarimetric observations, combined with theoretical modeling, in teasing apart the physics of these energetic explosions. I will review the status of radio polarimetric observations of GRB afterglows, and present the first discovery of polarized radio emission with the radio afterglow of GRB 190114C. I will describe how ALMA's unparalleled sensitivity for photometric and polarimetric observations is leading to new insights into the structure, composition, and magnetization of GRB jets. I will conclude by highlighting the current and future role of mm-band polarimetry in the ongoing multi-messenger revolution in extragalactic time-domain astrophysics.

Primary author: LASKAR, Tanmoy (Radboud University)

Co-authors: GILL, Ramandeep; GRANOT, Jonathan (Open University of Israel); ALEXANDER, Kate D. (Northwestern University); Prof. BERGER, Edo (Harvard University); Prof. MUNDELL, C. G. (University of Bath)

Presenter: LASKAR, Tanmoy (Radboud University)

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