

Extreme Transients in the High Energy Universe

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The High Energy Universe is rich in diverse populations of objects spanning the entire cosmological (time)scale, from our own present-day Milky Way to the re-ionization epoch. Several of these are associated with extreme conditions irreproducible in laboratories on Earth. Their study thus sheds light on the behavior of matter under extreme conditions, such as super-strong magnetic fields (in excess of 10^{14} G), high gravitational potentials (e.g., Super Massive Black Holes), very energetic collimated explosions resulting in relativistic jet flows (e.g., Gamma Ray Bursts, exceeding 10^{53} ergs). In the last thirty years, my work has been mostly focused on two apparently different but potentially linked populations of such transients: magnetars (highly magnetized neutron stars) and Gamma Ray Bursts (strongly beamed emission from relativistic jets), two populations that constitute unique astrophysical laboratories, while also giving us the tools to probe matter conditions in the Universe to redshifts beyond $z=10$, when the first stars and galaxies were assembled. I did not make this journey alone – I have either led or participated in several international collaborations studying these phenomena in multi-wavelength observations; solitary perfection is not sufficient anymore in the world of High Energy Astrophysics. I will describe this journey, present crucial observational breakthroughs, discuss key results and muse on the future of this field.