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**A Systematic Reconstruction and Quantification of the Lag-Luminosity Relationship in Gamma-Ray Bursts** JOSHUA OSBORNE, AMIR SHAHMORADI, University of Texas at Arlington — Gamma-Ray Bursts (GRBs) are the most energetic explosions in the universe, releasing much of their energies, on the order of $10^{52}$ ergs, in a fraction of a second to minutes in the form of gamma rays. Two classes of GRBs have been so far confirmed to exist: the short-duration class which are due to the merger of Neutron stars and the long-duration class which are attributed to the death of supermassive stars. The light-curves of GRBs typically exhibit temporal lags at different energies, and a potential negative correlation between the intrinsic brightness and the lightcurve's lag at different energies among GRBs have been observed and hypothesized to exist. The extent to which this relationship holds however, has been the subject of debates and not fully explored, in particular, because of the lack of information about the redshifts for the majority of the observed GRBs. In this work, we attempt to further quantify the strength and the validity of this relation. We achieve our goal by first quantifying the observed spectral lags of GRBs in the largest catalog of GRBs available to this date: the BATSE catalog and second, by mapping the computed GRB lags and brightness to the cosmological rest-frame of these events.

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