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Quantifying 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 energy on the order of 10^{52} ergs in the form of gamma rays. Two classes of GRBs, the short duration (SGRB), and the long-duration (LGRB) classes have been so far confirmed to exist. Unlike SGRBs, the light-curves of LGRBs typically exhibit temporal lags at different energies. A potentially-strong negative correlation between the intrinsic brightness and the lightcurve's lag at different energies for this class has been also observed and hypothesized to exist. The extent to which this relationship holds, however, has been the subject of debates due to the lack of information about the redshifts for the majority of the observed GRBs. In this work, we 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. Our findings indicate that the originally-proposed strong correlation between the lag and the luminosity of LGRBs is likely affected by the presence of strong selection effects in the detection and redshift-measurement processes.

Joshua Osborne
University of Texas at Arlington

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