

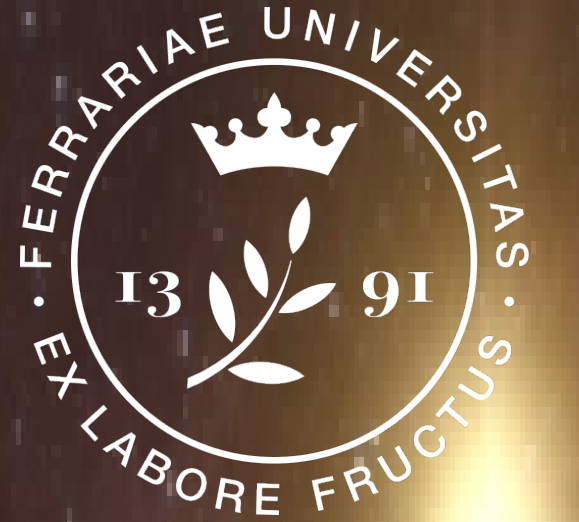
The hidden population of long gamma-ray bursts from compact object mergers

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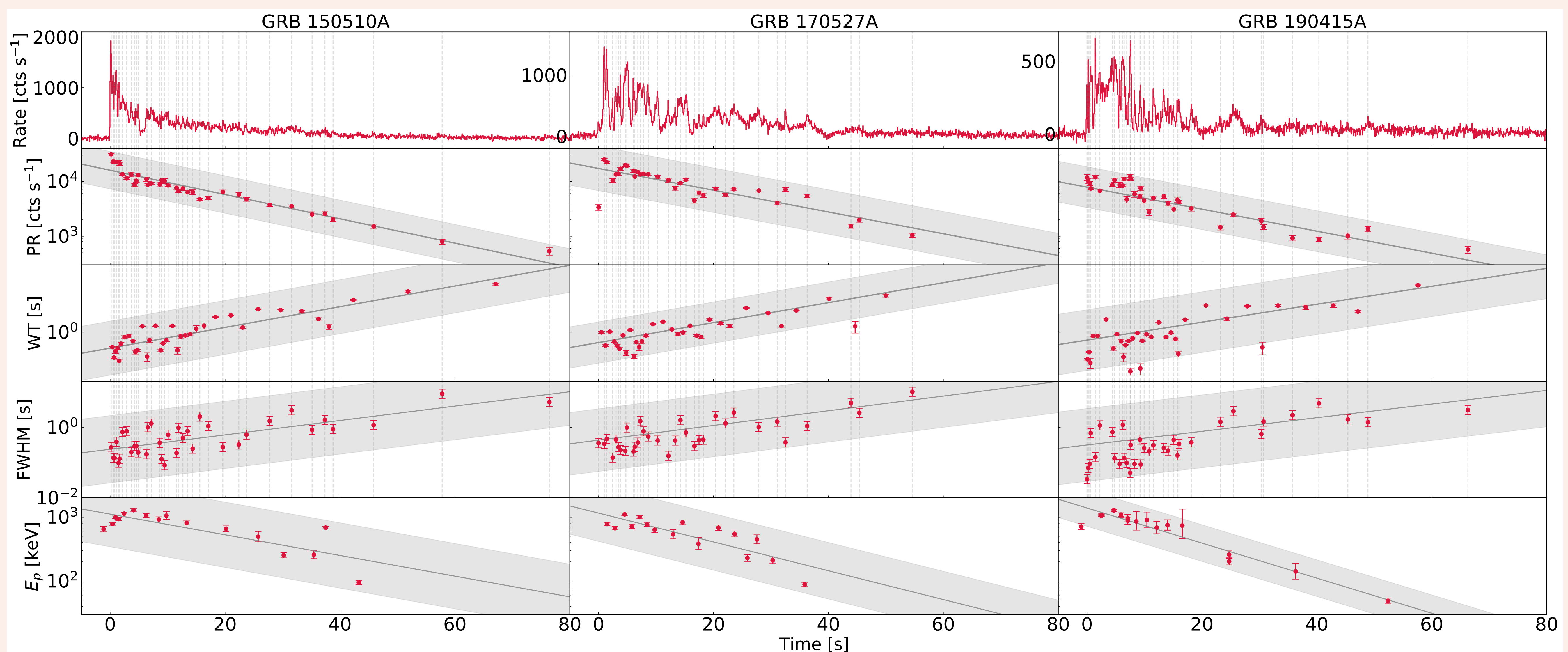
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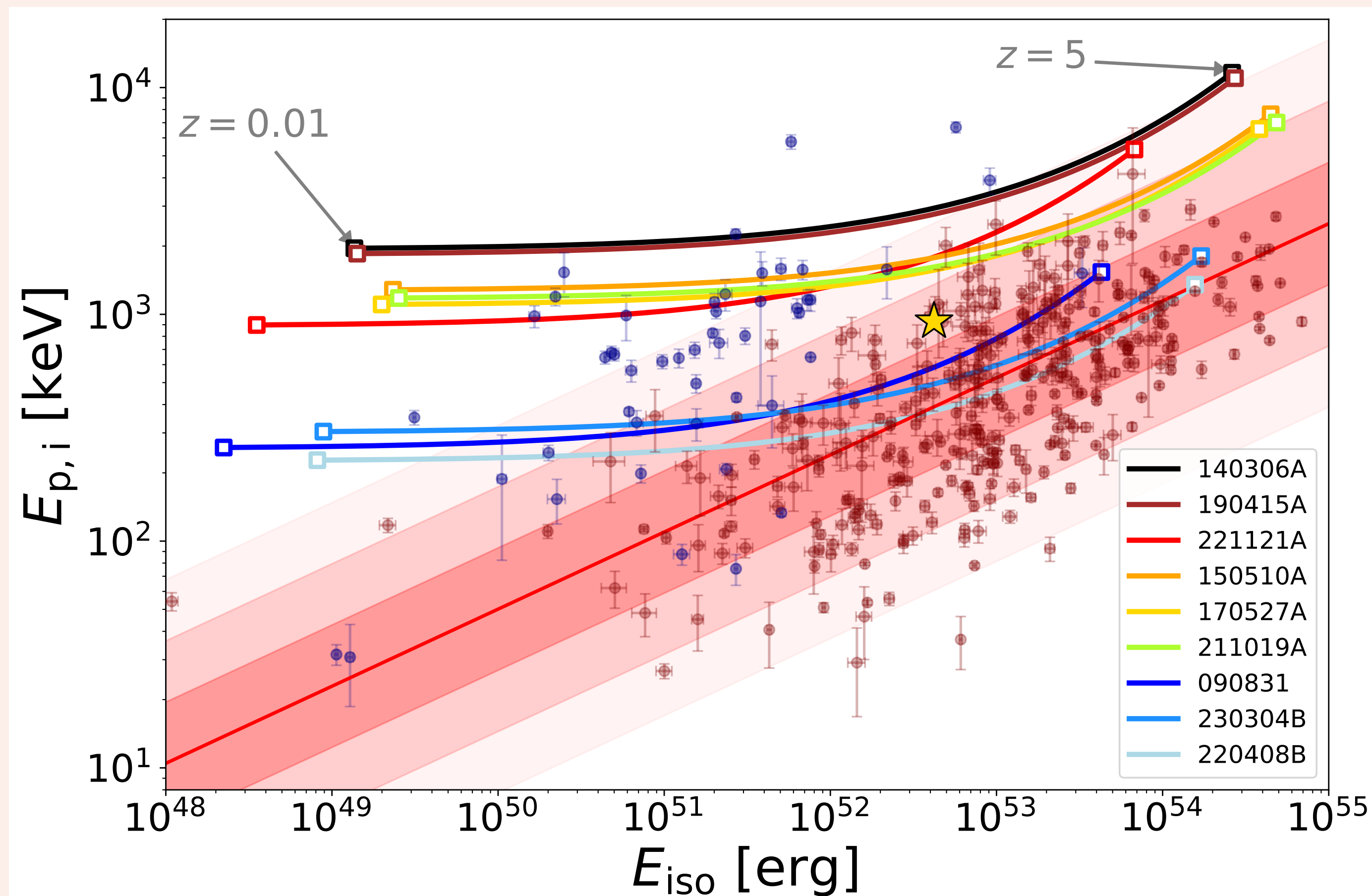
ABSTRACT

The γ -ray time profiles of **GRB 230307A** and other long-duration compact object merger (COM) candidates exhibit a unique set of temporal properties, characterised by a **deterministic evolution of waiting times and pulse widths**. We searched the Fermi/GBM catalogue for other unidentified long COM candidates showing similar temporal properties. Here, we examined the temporal and spectral prompt-emission properties of GRBs featuring at least eight peaks in their light curves. For candidates, all with unknown redshifts, that exhibited properties similar to GRB 230307A, we analysed their **trajectories in the $E_{p,i} - E_{iso}$ plane** as a function of redshift. We then evaluated the joint likelihood of their compatibility with the $E_{p,i} - E_{iso}$ relation satisfied by the bulk of long GRBs. Furthermore, we calculated **their minimum variability timescales (MVTs)** for comparison against known COM and collapsar populations. We identified **nine COM candidates with unknown redshifts** and demonstrated that there are **at least two outliers** of the $E_{p,i} - E_{iso}$ relation with 3.1σ (Gaussian) confidence level. Furthermore, their MVTs are **more consistent with those of COM than with collapsar GRBs**. These results indicate that this specific set of temporal properties can serve as a **diagnostic tool** to distinguish long-duration COMs from the broader collapsar population. Furthermore, our findings suggest that the **fraction of unidentified COMs among long GRBs** might be larger than previously assumed.

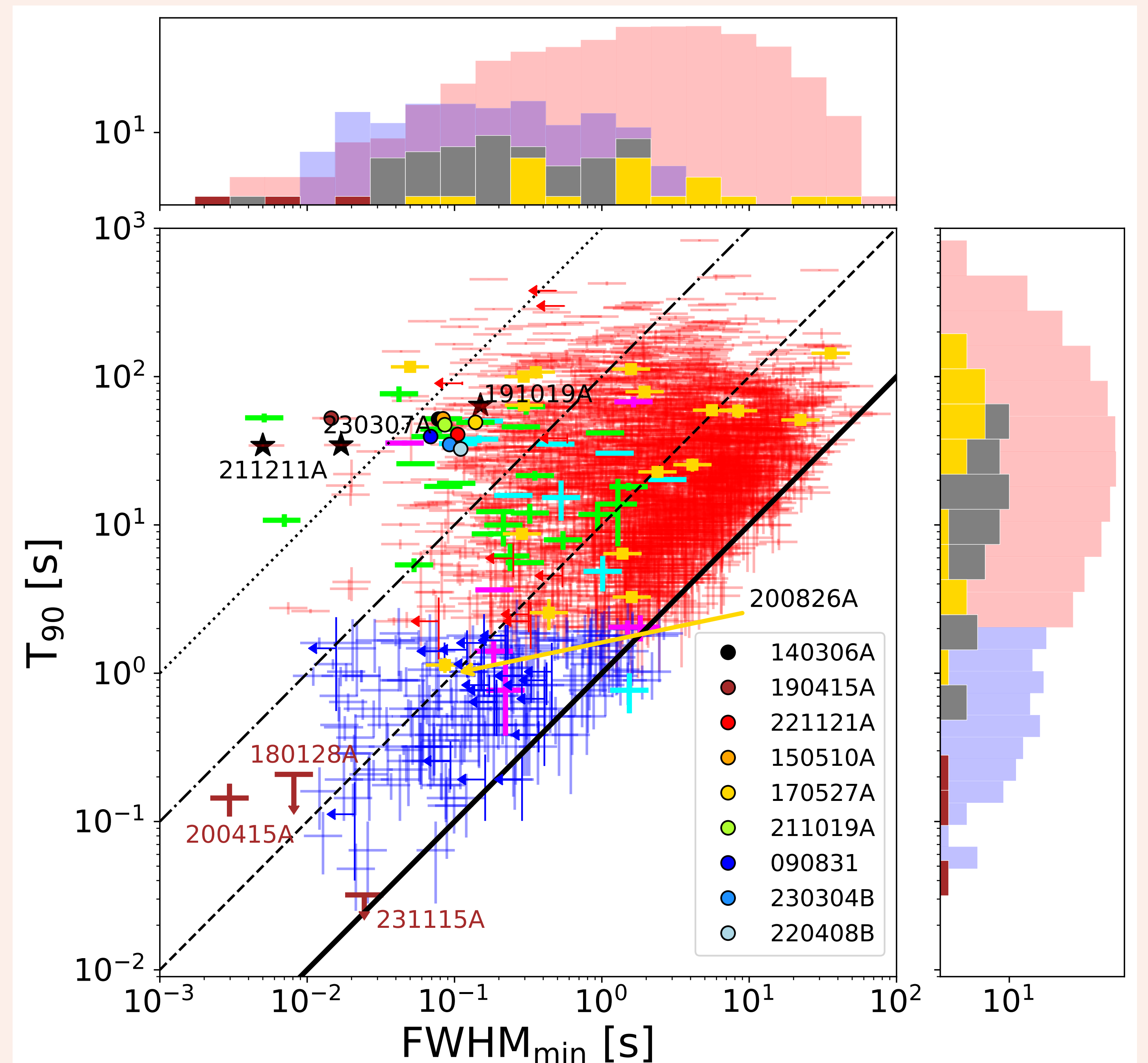
A distinctive temporal evolution in the γ -ray light curve for long merger candidates



$E_{p,i} - E_{iso}$: outliers of the Type-II Amati relation?



Compact mergers have short min variability timescale



Paper link & contact

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