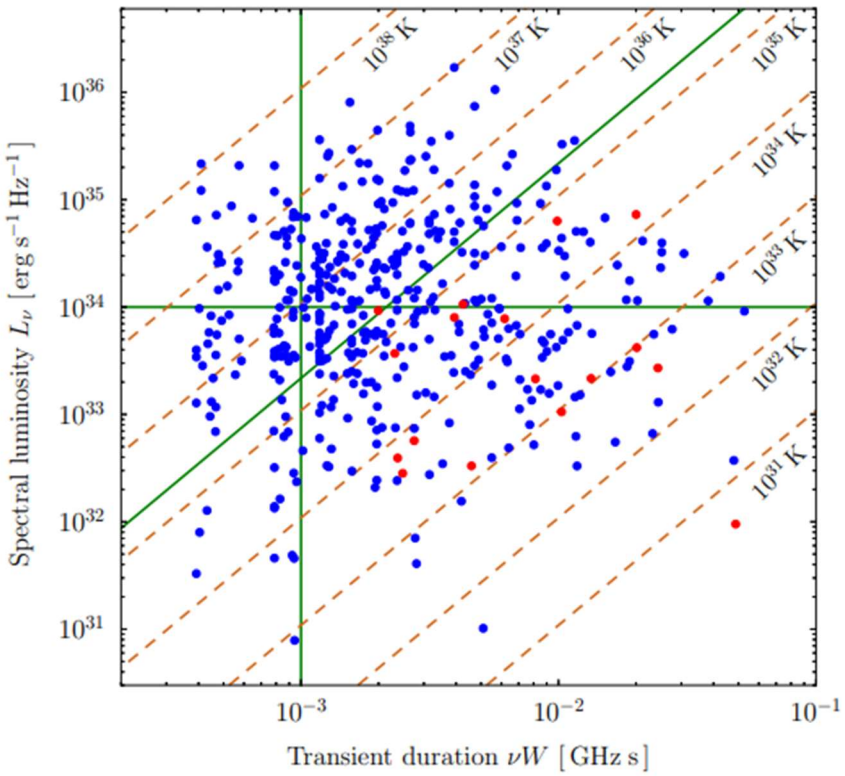
Classification of FRBs

Although fast radio bursts (FRBs) have been an active field in astronomy and cosmology, their origin is still unknown to date. One of the interesting topics is the classification of FRBs, which is closely related to the origin of FRBs. Different physical mechanisms are required by different classes of FRBs. In the literature, they usually could be classified into non-repeating and repeating FRBs. Well motivated by the observations, here we are interested in the possible subclassification of FRBs. By using the first CHIME/FRB catalog, we propose to subclassify non-repeating (type I) FRBs into type Ia and Ib FRBs. The distribution of type Ia FRBs is delayed with respect to the cosmic star formation history (SFH), and hence they are probably associated with old stellar populations, while the distribution of type Ib FRBs tracks SFH, and hence they are probably associated with young stellar populations. Accordingly, the physical criteria for this subclassification of type I FRBs have been clearly determined. We find that there are some tight empirical correlations for type Ia FRBs but not for type Ib FRBs, and vice versa. These make them different in physical properties.



There are obvious differences in the observed properties of type Ia FRBs and type Ib FRBs

Similarly, we suggest that repeating (type II) FRBs could also be subclassified into type IIa and IIb FRBs. A universal subclassification scheme is given at the end. This subclassification of FRBs might help us to reveal quite different physical mechanisms behind them, and improve their applications in astronomy and cosmology.