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Looking for a multi-wavelength counterpart for FRBs

Emission outside the radio band is predicted for most models trying to explain the FRB phenomenon. Its nature, however, is still to be determined, with the exception of the possible example provided by the Galactic FRB20200428A, where X-ray emission was observed simultaneously with the radio emission, with an energy ratio $E_X/E_{\text{radio}} = 10^5$.

I will review the targeted attempts to search for the multi-wavelength counterpart of FRBs and I will highlight the results of four years of multi-wavelength campaigns targeting FRB20180916B in optical, X- and gamma-rays, simultaneously with high sensitivity radio observations. Through this campaign the deepest prompt upper limits were obtained in optical and X-rays in terms of $E_{\text{MWL}}/E_{\text{radio}}$.

I will discuss the challenges of such large scale campaigns and the physical implications of our findings.

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