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Search for Low-Energy Signals from Fast Radio Bursts with the Borexino Detector

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A promising way of studying properties of distant objects and transient sources in the Universe is exploring neutrino coming from that sources. Such transients as Fast Radio Bursts (FRB) are of particular interest for astroparticle physics. FRB is a millisecond radio transient observed at extragalactic or cosmological distance. Numerous models with a wide variety of physical processes have been proposed to explain the origin of FRBs. Some of these models predict an low-energy neutrino emission from FRB. The most sensitive tool for studying neutrino with energies in the region 250 keV - 10 MeV is the Borexino detector, a unique 300 t mass low-background scintillator detector operated in the Gran Sasso Laboratory.

In the current work the search for signals with visible energies above 250 keV within a time window of ±1000 s centered at the detection time of 42 most intensive FRBs is described. An alternative approach based on search for specific shapes of neutrino-electron scattering spectra in the full exposure data of the Borexino detector have also been applied. As a result the strongest upper limits on the FRB-associated fluences of all flavors neutrino have been obtained.

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