

Search for gamma-ray emission from four accreting millisecond pulsars with Fermi /LAT

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We report our search for γ -ray emission in the energy range from 100 MeV to 300 GeV from four Accreting Millisecond Pulsars (AMPs), SAX J1808.4–3658, IGR J00291+5934, XTE J1814–338, and XTE J0929–314, with four-year observations of Large Area Telescope (LAT) onboard the Fermi γ -ray Space Telescope. The AMPs were not detected. We obtained their γ -ray luminosity upper limits and compared with γ -ray irradiation luminosities required for producing optical modulations seen from their companions suggested by Takata et al. (2012). The upper limits have excluded γ -ray emission as the heating source in these systems except XTE J0929–314. Our results also do not support the model proposed by Takata et al. (2012) that relatively strong γ -ray emission could arise from the outer gap of a high-mass neutron star controlled by the photon-photon pair-creation for the AMPs. For SAX J1808.4–3658 and IGR J00291+5934, we derive the upper limits of their γ -ray conversion efficiencies, which are 57% and 3%, respectively. We discuss the implications to the AMP systems by comparing the efficiency upper limit values with that of 20 γ -ray millisecond pulsars (MSP) detected by Fermi and the newly discovered transitional MSP binary J1023+0038.

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