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Limits on Large Extra Dimensions Based on Observations of Neutron Stars with the Fermi-LAT BIJAN BERENJI, ELLIOTT BLOOM, SLAC National Accelerator Laboratory/Stanford University/KIPAC, JOHANN COHEN-TANUGI, Laboratoire Univers et Particules de Montpellier, IN2P3 (France), FERMI-LAT COLLABORATION — We present limits for the compactification scale in the theory of Large Extra Dimensions (LED) of Arkani-Hamed, Dimopoulos, and Dvali. We use 11-months of Fermi-LAT data to set γ-ray flux limits for 6 gamma-ray faint neutron stars (NS). To set limits on LED, we use the model of Hannestad and Raffelt (HR) that calculates the Kaluza-Klein graviton (G_{KK}) production in supernova cores and the large fraction subsequently gravitationally bound around the resulting NS. The decays $G_{KK} \rightarrow \gamma\gamma$ should contribute to the flux from NSs. For $n = 2, 3, ..., 7$ LED of the same size in the context of the HR model, we use MC techniques to calculate the expected differential flux of gamma-rays arising from these KK gravitons, including the effects of the age of the NS, graviton orbit, and absorption of gamma-rays in the magnetosphere of the NS. We compare our MC differential flux to the experimental differential flux using maximum likelihood techniques, and obtain limits on LED that are more restrictive than past EGRET-based optimistic limits that do not include these important corrections. Additionally, our limits are more stringent than collider limits for 3 or fewer LED. If the effective Planck scale is around a TeV, then with $n = 2, 3$, the LED topology is non-toroidal.

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