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Characterizing the population of pulsars in the Galactic bulge with the Fermi Large Area Telescope

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Several groups have demonstrated the existence of an excess in the gamma-ray emission around the Galactic Center (GC) with respect to the predictions from a variety of Galactic Interstellar Emission Models (GIEMs) and point source catalogs. The origin of this excess, peaked at a few GeV, is still under debate. A possible interpretation is that it comes from a population of unresolved Millisecond Pulsars (MSPs) in the Galactic bulge. We investigate the detection of point sources in the GC region using new tools which the Fermi-LAT Collaboration is developing in the context of searches for Dark Matter (DM) signals. These new tools perform very fast scans iteratively testing for additional point sources at each of the pixels of the region of interest. We show also how to discriminate between point sources and structural residuals from the GIEM. We apply these methods to the GC region considering different GIEMs and testing the DM and MSPs interpretations for the GC excess. Our analysis is capable of finding the characteristics of this putative population of MSPs in the Galactic bulge of our Galaxy. Additionally, we create a list of promising MSP candidates that could represent the brightest sources of a MSP bulge population.

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