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TITLE:

The dark connection between the Canis Major dwarf, the Monoceros ring, the gas flaring, the rotation curve and the EGRET excess of diffuse Galactic Gamma Rays

ABSTRACT:

The excess of diffuse galactic gamma rays above 1 GeV, as observed by the EGRET telescope on the NASA Compton Gamma Ray Observatory, shows all the key features from Dark Matter (DM) annihilation:

- 1) the energy spectrum of the excess is the same in all sky directions and is consistent with the gamma rays expected for the annihilation of WIMPs with a mass between 50-100 GeV;
- 2) the intensity distribution of the excess in the sky is used to determine the halo profile, which was found to correspond to the usual profile from N-body simulations with additional substructure in the form of two toroidal structures at radii of 4 and 13 kpc;
- 3) Recent N-body simulations of the tidal disruption of the Canis Major dwarf galaxy show that it is a perfect progenitor of the ringlike Monoceros tidal stream of stars at 13 kpc with ring parameters in perfect agreement of the EGRET data;
- 4) The mass of the outer ring is so large, that its gravitational effects influence both the gas flaring and the rotation curve of the Milky Way. Both effects are clearly observed in agreement with the DMA interpretation of the EGRET excess;
- 5) The analysis is fully consistent with Supersymmetry, the leading theory to explain the Dark Matter. In the EGRET scenario the WIMP has the properties similar to a spin 1/2 photon, so the DM can be thought of as the supersymmetric partner of the CMB in that case.