Untangling the Complexity in the Galactic Centre: a way to understand the origin of the gamma-ray emission from the inner Galaxy

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- The origin of the Very High Energy (VHE) emission from the Miliky Way Galactic Center (GC) is still unknown
- Several attempts for interpreting the observed emission: PeVatron scenario, inhomogeneous diffuse Cosmic Rays *sea* (CR-*sea*) scenario, and many more
- Currently Imaging Atmospheric Cherenkov Technique (IACT) telescopes observed VHE gamma-ray excess from the so-called *Central Molecular Zone* (CMZ), in particular from the *Galactic Ridge* region
- Large Area Telescope (LAT) — onboard of NASA *Fermi* GLAST satellite — observed a gamma-ray excess in the High Energy (HE) regime
- In the hard CR-*sea* scenario, the background emission of Our Own Galaxy is the result of radial dependent CR transport, with additional *hardening* reproducing the observations of PAMELA, AMS-02 and CREAM, and MILAGRO anomaly
- Adoption of several models characterized by different configuration of parameters space, and uncertainties in gas mass content of the region
- Observations and models comparison
- Due to large systematics, uncertainties on the gas distribution, and lack of a detailed 3D description of the morphology and dynamics of the region, is not possible to reach definitive conclusions
- The upcoming new generation telescopes, such as *Cherenkov Telescope Array* (CTA) with increased sensitivity and angular resolution, may lead to a better explanation of the phenomena operating in the inner Galaxy