Cherenkov Telescope Array Sensitivity to the Putative Millisecond Pulsar Population responsible for the Galactic Center Excess

Oscar Macias
Kavli IPMU (Tokyo U.) and GRAPPA (Amsterdam U.)

1 What is this contribution about?

Past studies of the *Fermi* Galactic Center Excess (GCE) have found evidence for a "high-energy tail" in the GCE spectrum. If this high-energy tail extends to multi-TeV energies, then it could be detectable by the upcoming Cherenkov Telescope Array (CTA). In this contribution, we present the results of an exhaustive study on simulated data, in which we analyze the CTA sensitivity to the high-energy tail of the GCE.

2 Why is it relevant/interesting?

Prompt gamma-ray emission from an unresolved population of millisecond pulsars (MSPs) can account for the GCE at GeV-scale energies. This same MSPs population could inject multi-TeV electrons/positrons into the interstellar medium, which would produce a high-energy tail through inverse-Compton (IC) radiation. Therefore, detecting this multiwavelength signal with CTA would provide corroborating evidence for the MSPs explanation of the GCE.

3 What have we done?

We ran detailed simulations of the astrophysical background towards the Galactic Center (GC) using GALPROP. Similarly, we constructed detailed simulations of the expected IC signal from MSPs in the GC. Using the latest CTA instrument response functions, we created mock data and studied the necessary conditions for a reliable CTA discovery of the MSPs population responsible for the GCE.

4 What is the result?

We found that CTA has the necessary sensitivity to detect the high-energy tail of the GCE for physically plausible electron acceleration efficiencies. Furthermore, in the event that CTA observes an excess of diffuse gamma rays in the GC, it will be able to discriminate between the dark matter and MSPs hypotheses.