

# Gamma-ray emission from the Galactic center and implications of its past activities

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Radiatively inefficient accretion flows (RIAFs) in low-luminosity active galactic nuclei (LLAGNs) have been suggested as cosmic-ray and neutrino sources, which may largely contribute to the observed diffuse neutrino intensity. We show that this scenario naturally predicts hadronic multi-TeV gamma-ray excesses around galactic centers. The protons accelerated in the RIAF in Sagittarius A (Sgr A) escape and interact with dense molecular gas surrounding Sgr A, which is known as the Central Molecular Zone (CMZ), and produce gamma rays as well as neutrinos. Based on a theoretical model that is compatible with the IceCube data, we calculate gamma-ray spectra of the CMZ and find that the gamma rays with  $\lesssim 1\text{TeV}$  may have already been detected with the High Energy Stereoscopic System (HESS), if Sgr A was more active in the past than it is today as indicated by various observations. Our model predicts that neutrinos should come from the CMZ with a spectrum similar to the gamma-ray spectrum. We also show that such a gamma-ray excess is expected for some nearby galaxies hosting LLAGNs.

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