

The Very High Energy Emission of the Galactic Center

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Abstract

Since 2004, the High Energy Stereoscopic System (H.E.S.S) has been observing the sky in energy bands above 100 GeV, using the Vavilov-Cherenkov effect. One of the most noteworthy source at high gamma energies is the point-like source known as HESS J1745-290, which matches the position of the galactic center itself, Sagittarius A*. Since at Sgr A* lies the supermassive black hole of our galaxy, and since compact objects are known to generate very high energy photons, the question of whether or not this gamma-ray source originates from the black hole (more precisely from its surroundings and accretion disk) is a most relevant one. Using the 15 years of H.E.S.S observations at our disposal, and the latest analysis tools of the `gammapy` python library, we will deepen our description of the galactic central region at those energies, in particular by better describing the diffuse gamma ray emission that surrounds the galactic center. The key elements of the source that need to be investigated are : its extension, its spectral components and its potential temporal variability. Moreover, the thesis will also attempt to model the behaviour of the source phenomenologically. Finally, new tools will be developed for data analysis, especially as we will try to estimate the first results of C.T.A (Cherenkov Telescope Array), the next main project in Cherenkov astronomy.

Keywords — Black Holes, High Energy Astrophysics