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Spectral modelling of H.E.S.S.-detected PWNe

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Abstract content
   (Max 300 words)
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In the last decade ground-based Imaging Atmospheric Cherenkov Telescopes (IACTs) have discovered almost 150 very-high-energy (VHE; $E > 100$ GeV) γ-ray sources. Roughly 30 of these are confirmed pulsar wind nebulae (PWNe), while other source classes include supernova remnants, active galactic nuclei, or unidentified sources. A subset of latter may eventually turn out to be PWNe. It has been noted that the TeV flux of PWNe does not correlate with the spin-down luminosity of their embedded pulsars and it is currently unclear whether there is any correlation between the TeV surface brightness of the PWNe and the spin-down luminosity of the associated pulsar. We will present first results from an emission code that models the spectral energy density (SED) of a PWN by solving the Fokker-Planck transport equation. Although models such as these have been developed before, most of them model the geometry of a PWN as that of a single sphere. We have created a time-dependent, multi-zone model to investigate changes in the particle spectrum as the particles diffuse through the PWN, as well as the predicted radiation spectrum at different positions in the PWN. We will use the model to fit observed spectra of several PWNe that are not point sources, incorporating data from the High Energy Stereoscopic System (H.E.S.S.) as well as radio and X-ray experiments. Once the model has been calibrated, we will perform a population study to probe a potential relationship between the TeV surface brightness and the spin-down luminosity of the embedded pulsar.

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MSc

Main supervisor (name and email)
and his / her institution

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