

Recent very-high-energy (VHE) results on pulsars and pulsar wind nebulae (PWN)

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For many years, high-energy pulsar models were rather uncertain as to the expectations of detectable pulsed TeV spectral components from pulsars. Surprisingly, MAGIC announced the detection of pulsations from the Crab pulsar up to 25 GeV in 2008, followed by the VERITAS pulsed detection up to 400 GeV, and finally MAGIC's detection up to 1.5 TeV. This opened a new window into pulsar science. H.E.S.S.-II next detected pulsed emission from the Vela pulsar in the sub-20 GeV to 100 GeV range, with their latest observations unveiling pulsed emission at a few TeV. Additionally, H.E.S.S.-II detected pulsed emission from PSR B1706-44 in the sub-100 GeV energy range, and MAGIC detected pulsed emission from the Geminga pulsar between 15 GeV and 75 GeV. These new detections open up questions as to the origin and nature of the VHE pulsed spectra from pulsars, challenging theorists to rethink established theoretical frameworks. Additionally, these new constraints naturally feed into the study of VHE pulsar wind nebulae (PWNe) that surround the energetic pulsars. In 2018, H.E.S.S. released a PWN VHE catalogue based on their 9-year Galactic Plane Survey, revealing new correlations and spurring on theoretical progress. HAWC has furthermore detected spatially extended TeV sources (pulsar halos) surrounding two middle-aged pulsars, opening questions regarding PeV accelerators. In this talk, I will discuss some recent progress in the field and assess the theoretical progress that has been made. I will also mention the questions that the Cherenkov Telescope Array (CTA) will be able to tackle.

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