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The very-high-energy emission of the Crab pulsar with MAGIC

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The Crab pulsar (PSR J0534+2200), whilst being among the best studied objects in the sky, still challenges our understanding of the very-high-energy (VHE) emission processes in pulsars. Pulsed gamma rays are detected beyond 1 TeV, with a phase-folded lightcurve that presents two characteristic peaks joint by a “bridge”. The trailing peak progressively becomes more dominant as energy increases from the 100 MeV range towards the 100 GeV scale, mirroring the behavior observed in X-rays. While generally involving a synchro-curvature and inverse-Compton component, different theoretical frameworks disagree in the identification of the emission region and its dynamics.

In this talk, we will present extensive observations of the Crab pulsar by the MAGIC telescopes, focussing in the low-energy range between 20 GeV and 400 GeV, and totalling to more than 100 h of good quality data. Phase-resolved spectra are derived and compared with the high-energy emission obtained from Fermi-LAT, resulting in a unique and novel joint dataset of the flux development both in energy and phase. The stability of the VHE emission over timescales of weeks to months is also assessed for the first time.

MAGIC consists of two twin imaging atmospheric Cherenkov telescopes operating jointly in stereoscopic mode on the Canary island of La Palma, in Spain.

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