

## Fermi + HESS analysis on the Crab nebula

*Tuesday, 30 July 2024 14:00 (30 minutes)*

The Crab Nebula serves as a unique laboratory for studying the acceleration of electrons and positrons through their non-thermal radiation. In this contribution, I would like to present the first fully self-consistent analysis of the Crab Nebula's  $\gamma$ -ray emission over five orders of magnitude in energy (from 1 GeV to  $\sim$ 100 TeV). By combining 11.4 years of data from the Fermi Large Area Telescope with 80 hours of High Energy Stereoscopic System (H.E.S.S.) data, we provide a measurement of the spatial extension of the nebula and its energy spectrum.

Our findings reveal evidence for a shrinking of the nebula with increasing  $\gamma$ -ray energy. However, none of the phenomenological models we tested can fully describe both the spatial extension and the spectral energy distribution simultaneously. Notably, the extension measured at TeV energies appears larger than expected when compared to the X-ray emission. Our measurements also shed light on the structure of the magnetic field between the pulsar wind termination shock and the dust torus, suggesting that the magnetic field strength decreases with increasing distance from the pulsar.

**Primary author:** Mr UNBEHAUN, Tim (ECAP)

**Presenter:** Mr UNBEHAUN, Tim (ECAP)

**Session Classification:** Galactic