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Spatio-Spectral Modelling of the Pulsar Wind Nebula Kes 75

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Kes 75 (G29.7-0.3) is a Galactic composite supernova remnant with an embedded pulsar, PSR J1846-0258, that was discovered via X-ray timing. This pulsar powers a pulsar wind nebula that was seen to have expanded rapidly over the past several years. The pulsar's inferred spin period and derivative thereof imply a canonical age of only 720 years and a very high spin-down luminosity of $8e36$ erg/s. Later measurements revealed a braking index of $n = 2.65 \pm 0.01$. This value deviated from the canonical value of $n = 3$ for magneto-dipole braking radiation. A measurement of this quantity, subsequent to magnetar-like bursts plus a glitch that were detected in 2006, yielded an even lower value of $n = 2.16 \pm 0.13$. Significant gamma-ray emission was detected from Kes 75 by the H.E.S.S. Collaboration, although it was not possible to distinguish between shell and nebular emission. Taking into account the eventful history of this nebula during its short lifetime, we apply a multi-zone emission code to this source, finding reasonable joint fits to the broadband spectrum, X-ray surface brightness profile, expansion rate vs. time, and X-ray photon index vs. central radius.

Apply to be considered for a student ; award (Yes / No)?

No

Level for award;(Hons, MSc, PhD, N/A)?

N/A

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