Modelling Spatial and Temporal Emission Properties of the Young Pulsar Wind Nebula Kes 75

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Introduction

- Kes 75 is one of the youngest composite supernova remnants (~700 yr).
- Contains the pulsar wind nebula (PWN) of young glitching PSR J1846−0258.
- This pulsar has a high spin-down luminosity; magnetar-like outbursts in 2006.
- Gamma-ray emission detected by H.E.S.S. (HESS J1846-029). Unable to distinguish between shell and nebular emission.
- Plausibly be associated with HAWC-detected source 2HWC J1844−032.
- *Chandra*: rapid expansion of the PWN, X-ray flux decrease of 10% in 7 years.

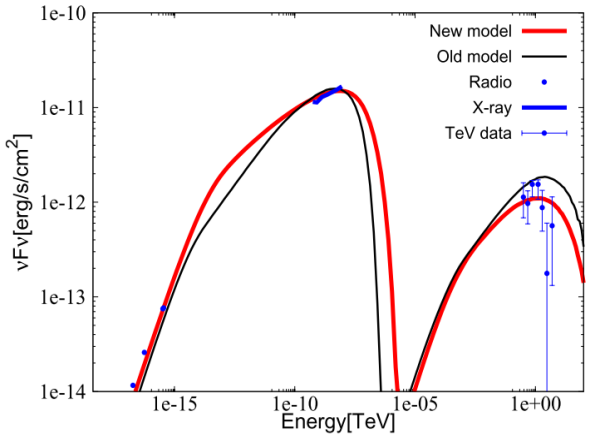
Model

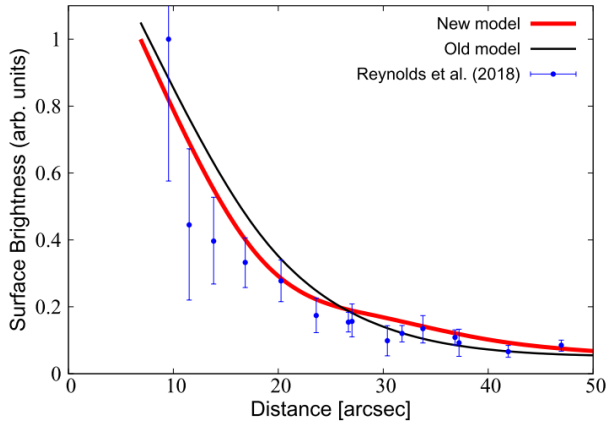
- We use a spatio-temporal leptonic emission code that calculates relativistic particle injection, transport, and emission as these particles traverse a PWN *(Van Rensburg et al. 2018; old model)*.
- The *new model* simulates energy release from the magnetar-like bursts, by increasing bulk motion of particles during last 50 years of the current age. Power-law parametrisation in energy for diffusion coefficient.

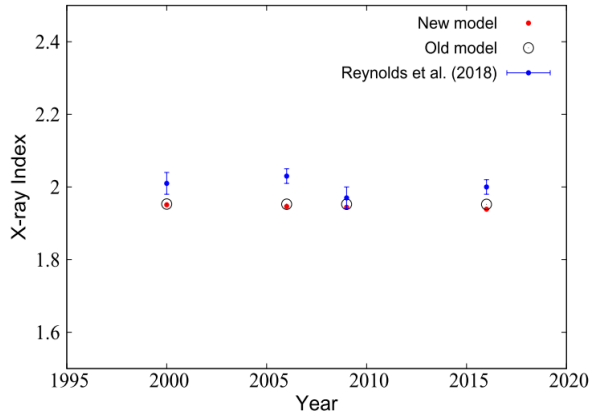
Results

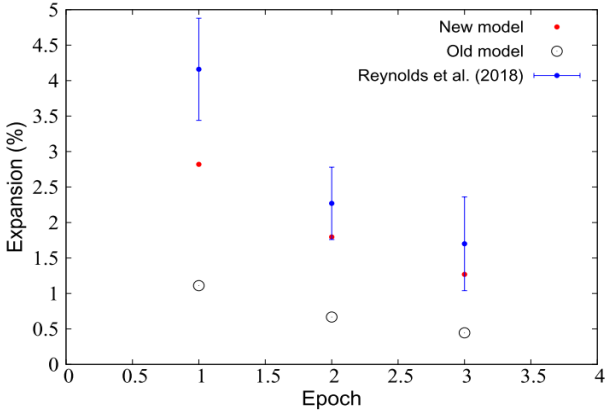
Fits to:

- SED
- X-ray surface brightness profile
- X-ray spectral index
- Expansion rate









Conclusions

- Improved fits to four features (SED, SB profile, spectral index vs. *r*, and expansion,) using our *new model*.
- Work in progress to refine the parameters.
- Future: study the effect of different changes to the underlying physics, and apply code to a sample of PWNe.