Contribution ID: **88** Type: **Contributed**

Modelling the optical polarized emission of AR Scorpii white dwarf pulsar

Thursday, April 15, 2021 7:45 AM (15 minutes)

We report the modelling of the optical polarized emission of the white dwarf pulsar in the binary system AR Scorpii (AR Sco) in the framework of the striped pulsar wind model constrained by optical photopolarimetric data. One of the main goals of this work is to constrain the parameters, which describe the white dwarf pulsar magnetic field geometry. Besides, we determine the location of the emitting region, inclination of the line of sight (LOS) with respect to the white dwarf pulsar spin axis, and the Lorentz factor Doppler boosting of the wind for a given particle density distribution and a finite thickness of the current sheet. We assume that the observed polarized emissions emanate from the wind synchrotron radiation produced within the sheets outside the light cylinder. We compute the Stokes parameters of the linearly polarized radiation and fit the total counts, linear counts, and polarization angle of the electric field to the photopolarimetric data folded on the spin phase of the white dwarf pulsar. We find that the model can reproduce the observed light curves main trends. An observer's viewing angle of [35 , 60] degree and a magnetic field inclination (relative to the rotation axis of the white dwarf) of [50 , 80] degree with synchrotron emission produced at a radial distance 1.6r L ≤ r ≤ 4.6r L (where r L denotes the light cylinder radius) can reasonably fit the observed pulse profiles at different orbital phases. This provides clear evidence of a pulsar-like particle acceleration process resulting from a striped magnetohydrodynamic wind produced by the white dwarf pulsar in AR Sco.

Primary author: RAMAMONJISOA, Fidy Andriamanankasina

Presenter: RAMAMONJISOA, Fidy Andriamanankasina

Session Classification: Exploring the Galaxy: Pulsars and Pulsar Wind Nebulae

Track Classification: Pulsar