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Signs of multipolar magnetic field on light-curves analysis

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Mass and radius constraints of compact stars (CS), i.e. Neutron stars (NS) and White Dwarfs (WD), based on electromagnetic data are challenging. Radius measurements are mainly based on observation of thermal emission and comparison with theoretical models. Modeling, however, due to the complex and relativistic nature of compact objects, suffers from a number of complications such as parameter degeneration, the unknown equation of state for NS (EOS), among other uncertainties.

In this work, we show the results of our newest software that calculates theoretical pulse profiles for a CS with thermal spots on its surface, and then finds the best parameters to fit a real pulse. We follow a procedure that allows us to treat circular spots of arbitrary size and location on the stellar surface within a spacetime described by Schwarzschild. We also take into account beaming and scattering effects through a partially ionized hydrogen atmosphere. Searching for the best parameters –e.g. stellar radius, hot spot sizes, viewing angles - is done using a bayesian procedure that also returns a statistical distribution for each parameter.

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