

Project description for the general public: Interpretation and modelling of pulsar polarisation and profiles.

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Observed radiative properties of pulsars make up for a panopticon of peculiarities. In the radio band, the profiles shapes suddenly change into a different form, and new profile components appear or disappear at different frequencies. Polarisation characteristics in the radio band are equally strange: the polarisation angle often jumps by 90 degrees at locations with high circular polarisation, and strong irregular distortions appear in the observed polarisation angle curves. The goal of this project is to understand these phenomena and to construct numerical model for them.

To interpret the phenomena we will employ recent findings such as the spiral geometry of the radio emission beam, and a new, empirical model of propagation effects, based on coherent addition of radio waves in two natural propagation modes. An advanced numerical code will be created for this purpose. First applications of these ideas have already appeared successful, but the models remain mostly unexplored and can still be applied to a number of pulsar puzzles. We therefore expect to advance the understanding of at least some radiative pulsar phenomena.