A magnetic field study in the envelope of cool evolved stars

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2 Abstract

Evolved cool stars, the future of our Sun, have a massive mass loss, which contributes to enrich the interstellar medium and so contribute to the recycle of the matter in the Universe. The mechanisms (e.g. the stellar magnetic field) behind this mass loss phenomena are not understood, but can be constrained thanks to observations of the star and its circumstellar envelope (CSE). With different radio-wave molecular line emissions, we traced the CSE matter at different radii. In this poster, we will focus on the SiO maser line emission that we observed, which probes the inner region of the envelope, up 2-4 stellar radii from the photosphere and can reveal the presence of a magnetic field. It is emitted by small gas cells in the CSE and is strongly polarized. With radio-astronomical observations, we can derive the Stokes parameters I, Q, U, V, and so, some proprieties of the emitted cell environment like the linear polarization, the angle of polarization, and the circular polarization, which according to theories can lead to an estimated of the magnetic field strength along the line of sight. If there is a magnetic field and if the maser line is saturated, we should observe a Zeeman signature on V : an "S" shape in the signal. We tried to determine if the maser is saturated or not and tried to find specific patterns in our data, and then derived the value of the magnetic field.