Modeling exoplanet transit and magnetic spots for interferometric study

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Abstract

Up to now, many techniques have been developed to detect and observe exoplanets, the radial velocity (RV) method being the most prolific one. However, stellar magnetic spots can mimic an exoplanet transit signal and lead to a false detection. A few models have already been developed to constrain the different signature of exoplanets and spots, but they only concern RV measurements or photometry. An interferometric approach, with high angular resolution capabilities, could resolve this problem.
Optical interferometry is a powerful method to measure accurate stellar diameters, and derive fundamental parameters of stars and exoplanets minimum masses. We have built an analytical code able to calculate visibility moduli and closure phases of stars with a transiting exoplanet, to be compared with a star with no exoplanet. From the difference of interferometric signal, we can derive the presence of the exoplanet, but this requires that the star is resolved enough. We have tested this code with current available facilities like VEGA/CHARA and determined which already discovered exoplanets systems can be resolved enough to test this method.

To make a more general study, we also tested different parameters (exoplanet and stellar diameters, exoplanet position) that can lead to a variation of the minimum baseline length required to see the exoplanet signal on the visibility modulus and the phase.
Stellar spots act in the same way, but the difference of local intensity between an exoplanet transit and a spot can easily be studied thanks to the interferometric measurements.

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