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Entitled

INVESTIGATING THE MAGNETIC CYCLE OF THE PLANET-HOSTING STAR HD189733

by

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Abstract

HD189733 is a planet-hosting star, harboring a hot Jupiter situated at approximately 8.8 stellar radii. This system is among the most studied systems for stellar magnetism, Star-Planet Interactions, and exoplanetary atmospheric studies. The large-scale magnetic field of the star exhibits variability on relatively short timescales, however, no magnetic field cycle, including polarity flips, has been observed to date. This absence of cycle detection could be due to observational gaps between observing campaigns.

This thesis aims to explore the variability of the activity of HD189733 by conducting a homogeneous analysis of several publicly available datasets, obtained using several spectrographs/telescopes, spanning 18 years. The primary objective is to assess whether this active star manifests an activity cycle, and to this end, an in-depth examination of activity indices periodicity is performed. Drawing inspiration from the Sun, where the activity cycle is known to be half of the magnetic polarity flip cycles (11 years versus 22 years), this study will explore the correlation between the star's activity information and its magnetic map information.

This research explores correlations between different magnetic manifestations to identify potential patterns, allowing for insights into the star's magnetic field behavior. Our results may help identify optimal observation periods to witness a polarity flip of the magnetic field of HD189733. This investigation not only contributes to the understanding of stellar magnetic activity but also has implications for refining observational strategies for stellar activity studies.

Keywords: Chromospheric Activity, Activity Cycles, Generalised Lomb-Scargle, False Alarm Probabilities, Magnetic Field.