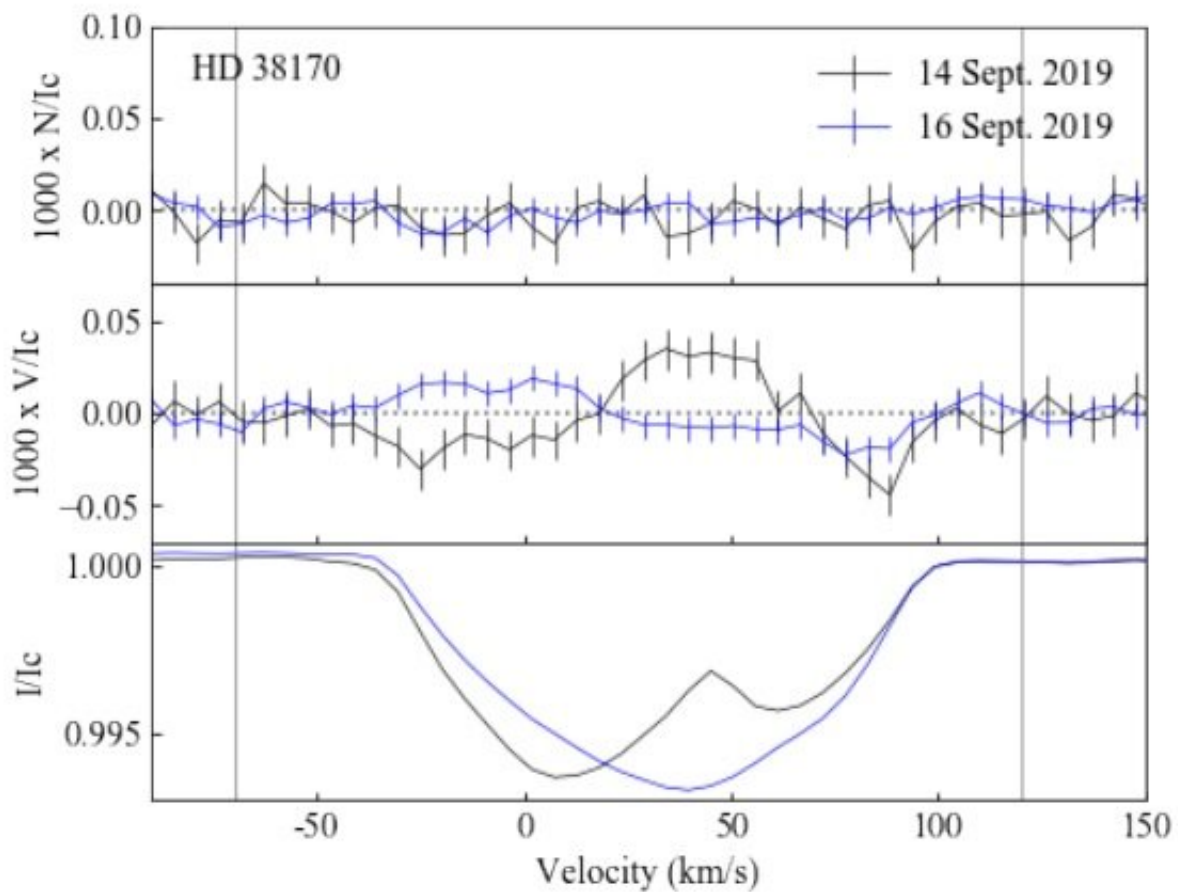


# HD 38170 is a magnetic B-type star, observations suggest

April 29 2020, by Tomasz Nowakowski



Least-Squares Deconvolution (LSD) profiles of HD 38170. Credit: David-Uraz et al., 2020.

An international team of astronomers has conducted spectropolarimetric observations of four stars identified by the MOBSTER (Magnetic OB[A] Stars with TESS: probing their Evolutionary and Rotational properties) project. The study found that one of the investigated objects is a magnetic B-type star. The finding is detailed in a paper published April 21 on the *arXiv* pre-print server.

Magnetic [stars](#) of spectral type O, B, and A (OBA) are relatively rare—for instance, only 11 magnetic O-type stars are known to date. Given that the formation mechanism of magnetic fields in these stars is still not fully understood, detecting new objects of this type is essential to advance our knowledge about this process.

A group of researchers led by Alexandre David-Uraz of the University of Delaware has conducted a search for magnetic OBA stars. For this purpose, they combed through the data from MOBSTER in order to investigate selected candidate magnetic B stars.

"This paper presents the first new magnetic detection achieved by the MOBSTER Collaboration and establishes the bases for its ongoing efforts to perform targeted spectropolarimetric surveys of massive and intermediate-mass magnetic candidates," the astronomers wrote in the paper.

As a result, the study found that one of the four investigated B-type stars exhibits a detectable magnetic field. The star, designated HD 38170, is chemically peculiar and classified as an Alpha<sup>2</sup> Canum Venaticorum ( $\alpha^2$  CVn) variable by previous studies. It now appears that this star has maximum longitudinal magnetic field of about 105 G and a dipolar field strength at a level of approximately 254 G.

According to the paper, HD 38170 has a radius of about 3.3 solar radii, mass of around 2.8 solar masses, and rotational period of about 1.38

days. The star is of spectral type B9.5V, has an effective temperature of 10,300 K, and is estimated to be 394 million years old.

Taking into account the results, the astronomers concluded that HD 38170 is an evolved late magnetic B-type star.

"The detection was achieved for HD 38170, which apparently is an evolved late B-type star. The fairly weak inferred field strength ( $B_d \sim 250$  G) is compatible with its proposed evolutionary status, and therefore this new detection lies in an undersampled region of the Hertzsprung-Russell diagram (e.g. Petit & David-Uraz 2020), given the dearth of known evolved magnetic massive stars (Fossati et al. 2016)," the authors of the study wrote.

However, they noted that more observations and sophisticated modeling are needed in order to fully characterize the magnetic field of this star. The researchers also added that the findings regarding HD 38170 show how much useful is TESS to perform a photometric selection of magnetic candidates.

**More information:** MOBSTER—IV. Detection of a new magnetic B-type star from follow-up spectropolarimetric observations of photometrically selected candidates, arXiv:2004.09698 [astro-ph.SR] [arxiv.org/abs/2004.09698](https://arxiv.org/abs/2004.09698)

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