



Destination exoplanet: Habitability conditions influenced by stellar winds properties

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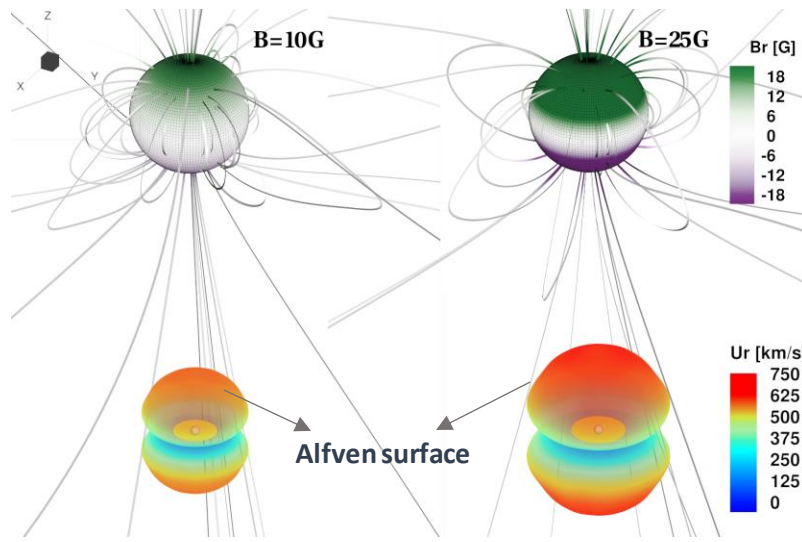


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Young cool stars are highly active stars; they exhibit elevated flare activity, coronal mass ejections, and stellar winds. While magnetic activity decreases with time, putting end to some of these phenomena, stellar winds persist throughout the entire stellar evolution. Therefore, the cumulative influence from stellar winds will be significant for both, the star's angular momentum evolution, as well as for possible exoplanets orbiting in the system. We aim to characterise these processes by creating a comprehensive grid of realistic models of stellar winds in cool stars.

Exploring the importance of the field strength

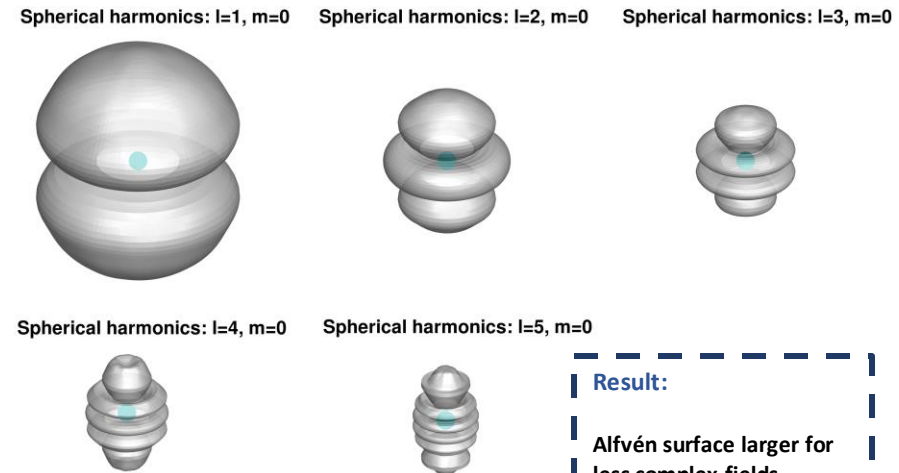


Results:

Alfvén surface larger for stronger fields

Wind speed increases for strong magnetic fields

Exploring the importance of the complex field geometry



The Alfvén surface sets the boundary between the stellar winds and magnetically-coupled outflows that do not carry angular momentum away from the star (such as loops and prominences).

The dimension of the Alfvén surface (AS) gives us insights on the effectiveness of the angular momentum loss on a star due to magnetized winds. Those two things (the AS size and the amount of mass loss) will eventually dictate how the rotational evolution of a star proceeds.

This journey opens a window for questions

Complex geometry field means denser stellar winds?

Faster winds means higher angular momentum loss?

Will quantities behavior be affected depending on the conditions?

Acknowledgment

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Why use a solar model for stellar winds?

The sun is the most understood star so far.

The sun's properties and characteristics are used as a starting point for other stars.

It has a collection of physics models used to simulate the environment.

Why are we interested in stellar winds?

Better understanding of Star-Planet interaction

Stars may lose mass due to stellar winds, and the evolution of stars is strongly affected by mass loss.

Process the shaping of exoplanet atmosphere.

Our current work

Creating comprehensive grid of numerical models by varying different parameters such as:

Magnetic field strength
Field geometry

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