AU Mic b and c can induce **radio emission** in the corona of their host star.

Planet-induced radio emission from the coronae of M dwarfs

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Kavanagh et al. (submitted)

Summary

- We model the stellar wind of the active planet-hosting M dwarf AU Mic.
- Planets b and c orbit sub-Alfvénically for the majority of their orbits, if the host star has a mass-loss rate of < 590 times that of the Sun ($\dot{M}_\odot$).
- In this case, the planets can induce radio emission in the corona of AU Mic at 10 MHz – 3 GHz, with peak flux densities of 10 mJy.

Stellar wind modelling

- We model the wind of AU Mic using the Alfvén wave-driven AWSoM model (van der Holst et al. 2014).
- Our models use the ZDI surface magnetic field map of the star (Figure 1, Klein et al. 2021b).
- We explore a scenario where AU Mic has a low (27 $\dot{M}_\odot$) and high (590 $\dot{M}_\odot$) mass-loss rate, by varying the Alfvén wave flux at the base of the chromosphere.

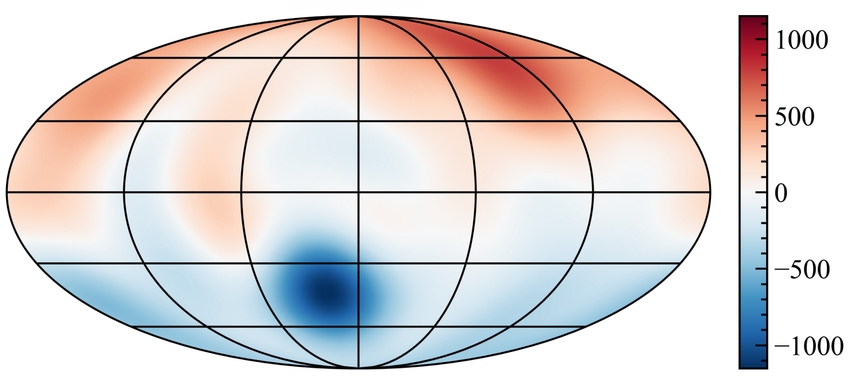

Figure 1: Radial surface magnetic field of AU Mic implemented in our stellar wind simulation.

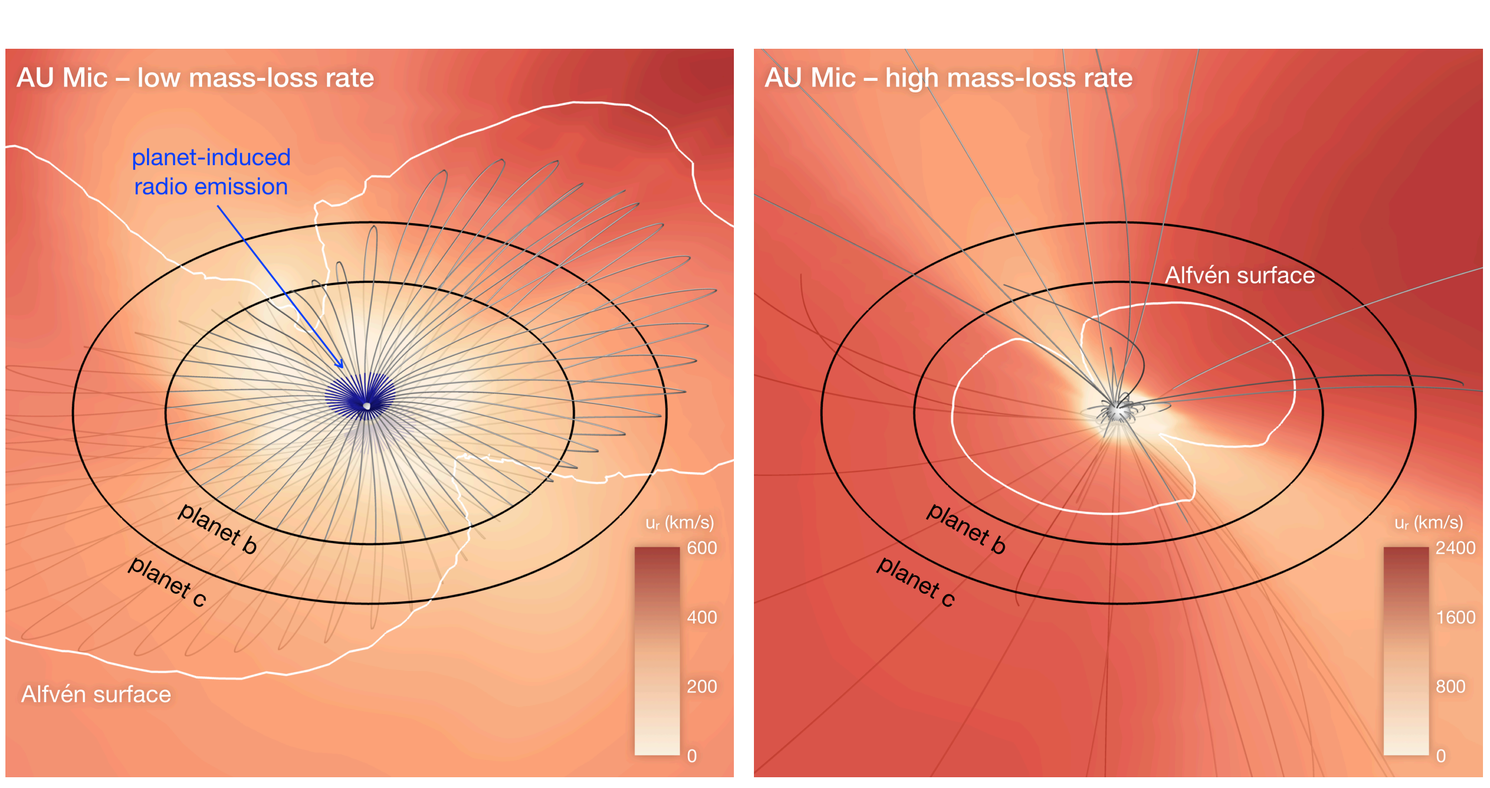

Figure 2: Stellar wind models of AU Mic with a low (27 $\dot{M}_\odot$) and high (590 $\dot{M}_\odot$) mass-loss rate (left and right). The planets orbit sub-Alfvénically if the mass-loss rate of AU Mic is < 590 $\dot{M}_\odot$.

Planet-induced radio emission in the corona of AU Mic

- For sub-Alfvénic orbits, the planets can produce Alfvén waves that travel back towards the star and induce radio emission (Turnpenney et al. 2018).
- Emission occurs along the magnetic field lines connecting to the planet, where the cyclotron frequency exceeds the plasma frequency (shown in blue in Figure 2).
- Figure 3 shows the resulting spectrum. At 140 MHz, the emission bears a striking similarity to that recently reported from GJ 1151 by Vedantham et al. (2020), which is indicative of being induced by a planet.

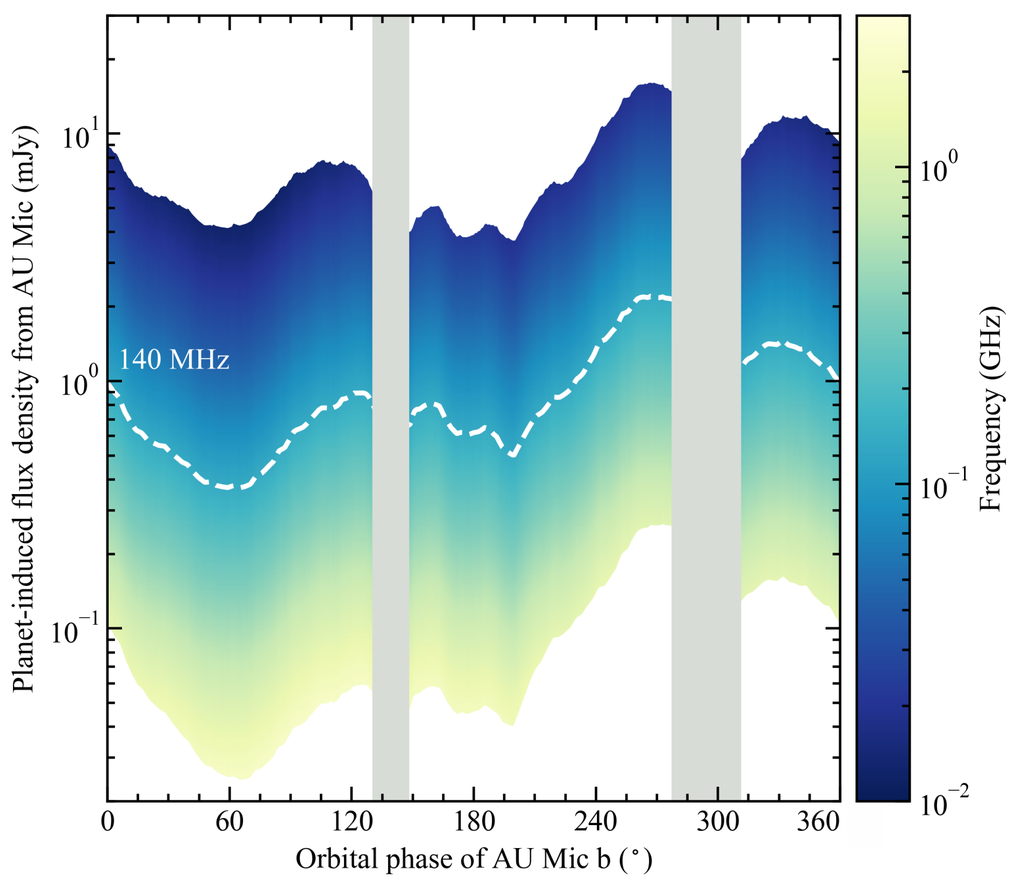

Figure 3: Radio spectrum of AU Mic induced by planet b. Planet c induces fluxes that are an order of magnitude lower.