λ Andromedae: Driving a post-main sequence wind from a solar-mass star

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Summary

- The first surface magnetic field map[1] for the star λ And (G8 IV; RS CVn)
- Simulated wind using both coronal and Alfvén-wave driven models[3]
- Constrained our simulations using archival radio observations[2] of the star
- Placed tight constraints on stellar mass-loss rate: 3×10^{-9} $M_\odot$ yr^{-1}
- Future radio observations to constrain emission mechanisms?

Wind Models & Radio Emission

- Tested parameter space for AWSoM in the case of λ And
- 1st time this code has been used to model post-MS stellar winds.
- We assumed the cluster of lower flux radio detections (Fig. 2) are due to quiescent thermal wind emission.
  - Alfvén wave-driven winds produce very weak thermal radio emission
  - Coronal winds produce stronger thermal radio emission
  - Due to differences in density structure in wind
- Results suggest hot coronal wind is most likely in this scenario

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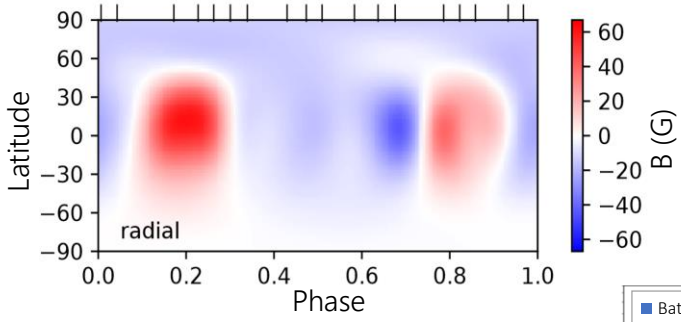

Figure 1: Radial surface magnetic field for λ And

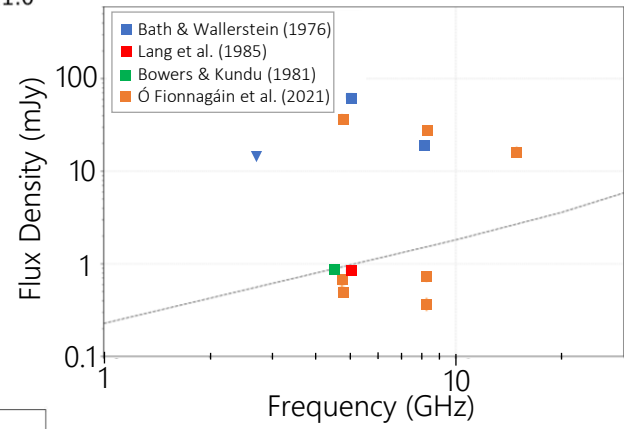

Figure 2: Archival radio observations of λ And. Taken between 1976-1999 with VLA/GBT covering 2-15 GHz. Dashed black line shows our best wind-emission spectrum from our models

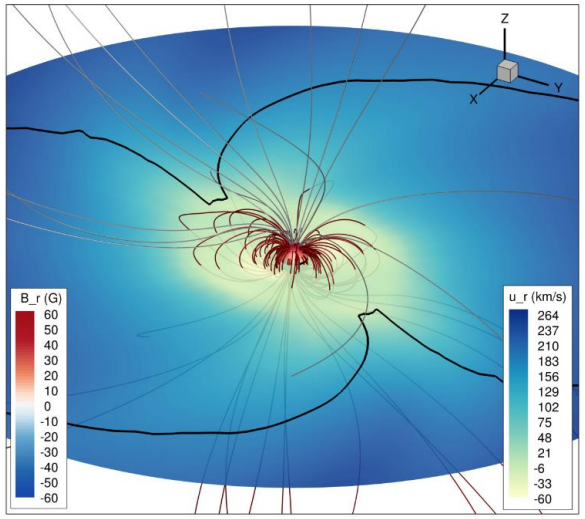

Figure 3: AWSoM simulation of λ And showing wind velocity distribution (blue plane). Dipolar magnetic field. Large Alfvén surface (black line). We calculated thermal radio flux density from such a wind and found it too low to match above observations.