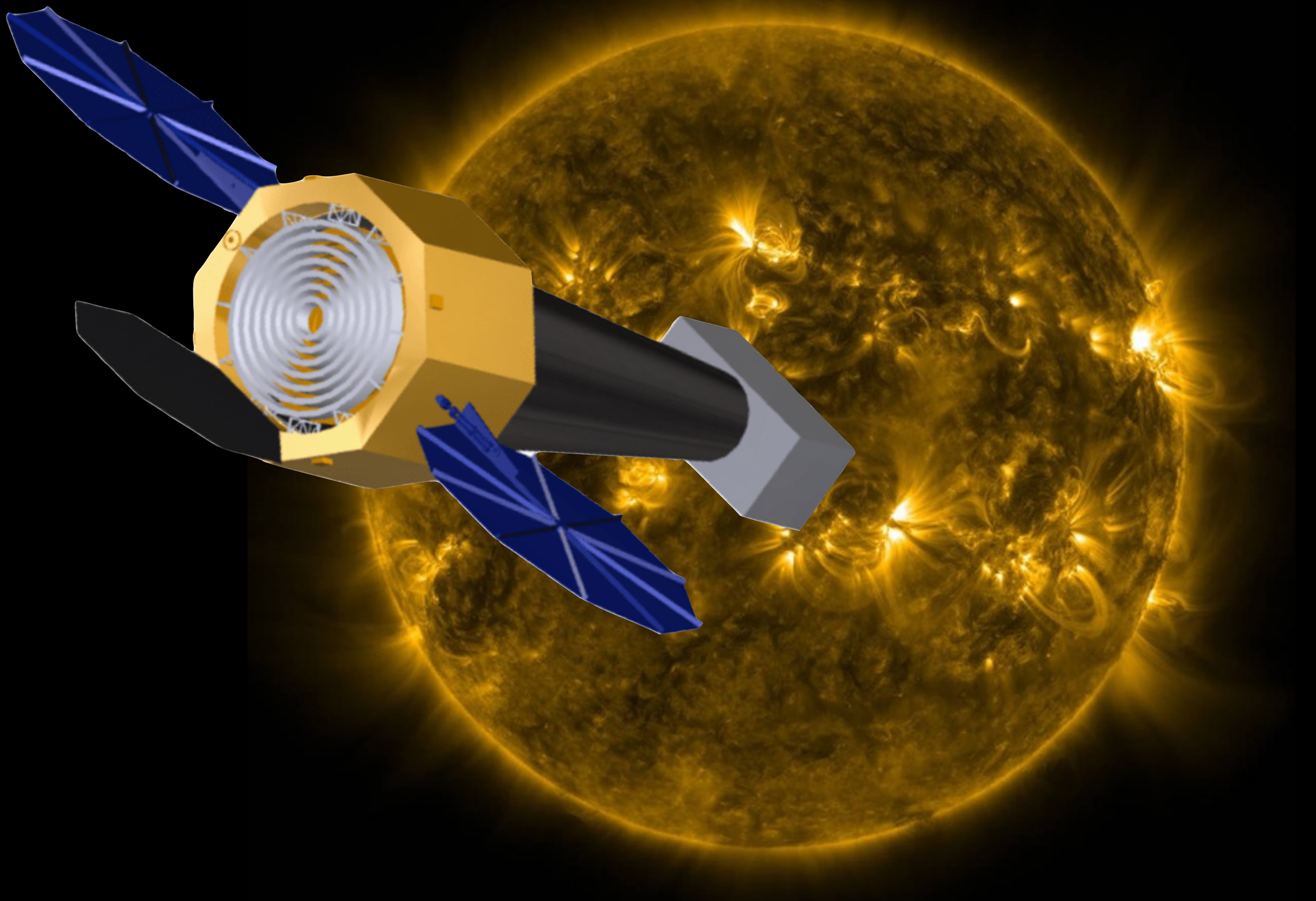
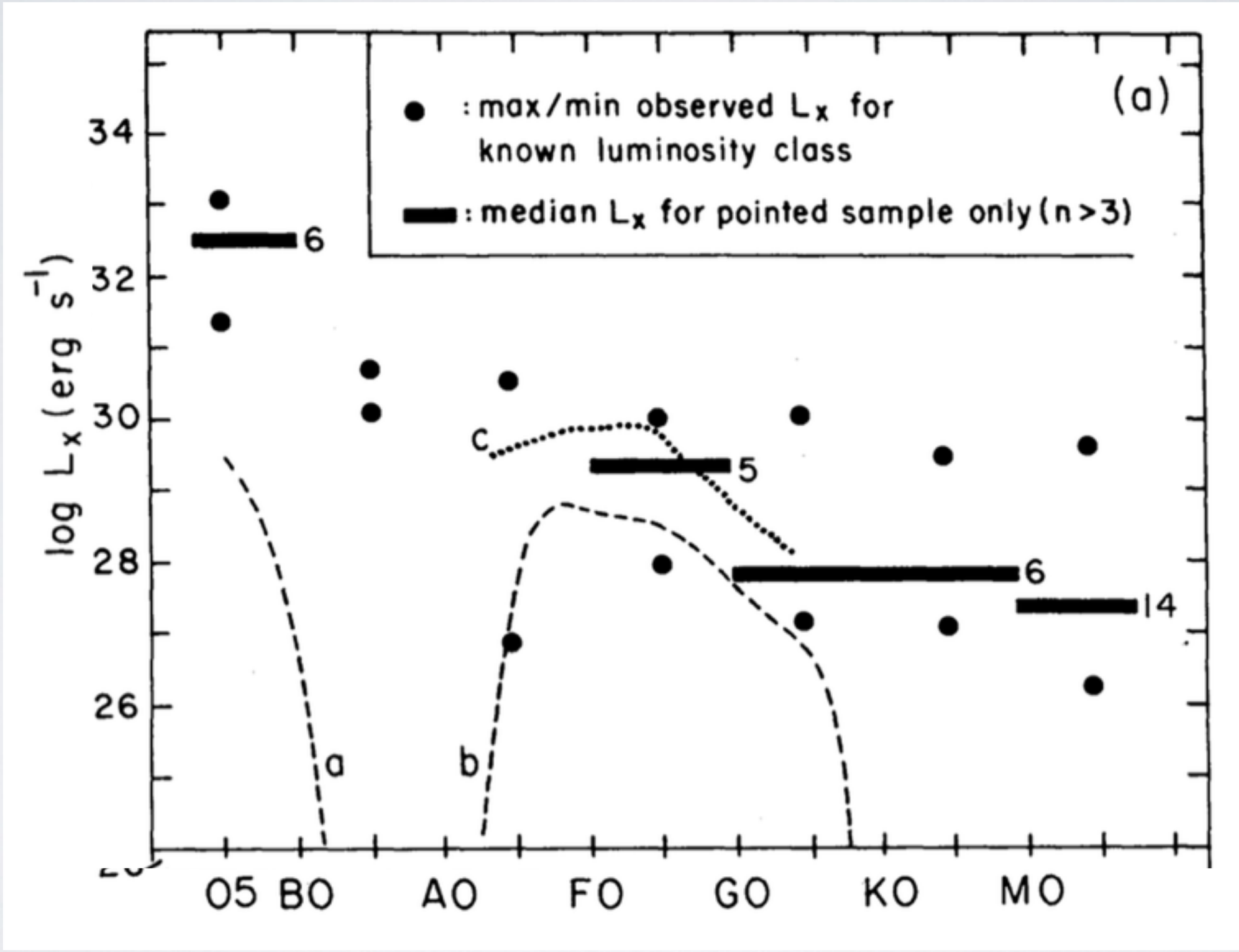


WHAT CAN LYNX DO FOR CORONAL PHYSICS?

Jeremy Drake,
Julian Alvarado-Gomez, Sofia Moschou, Cecilia Garraffo (SAO)
Ofer Cohen (UMass Lowell)

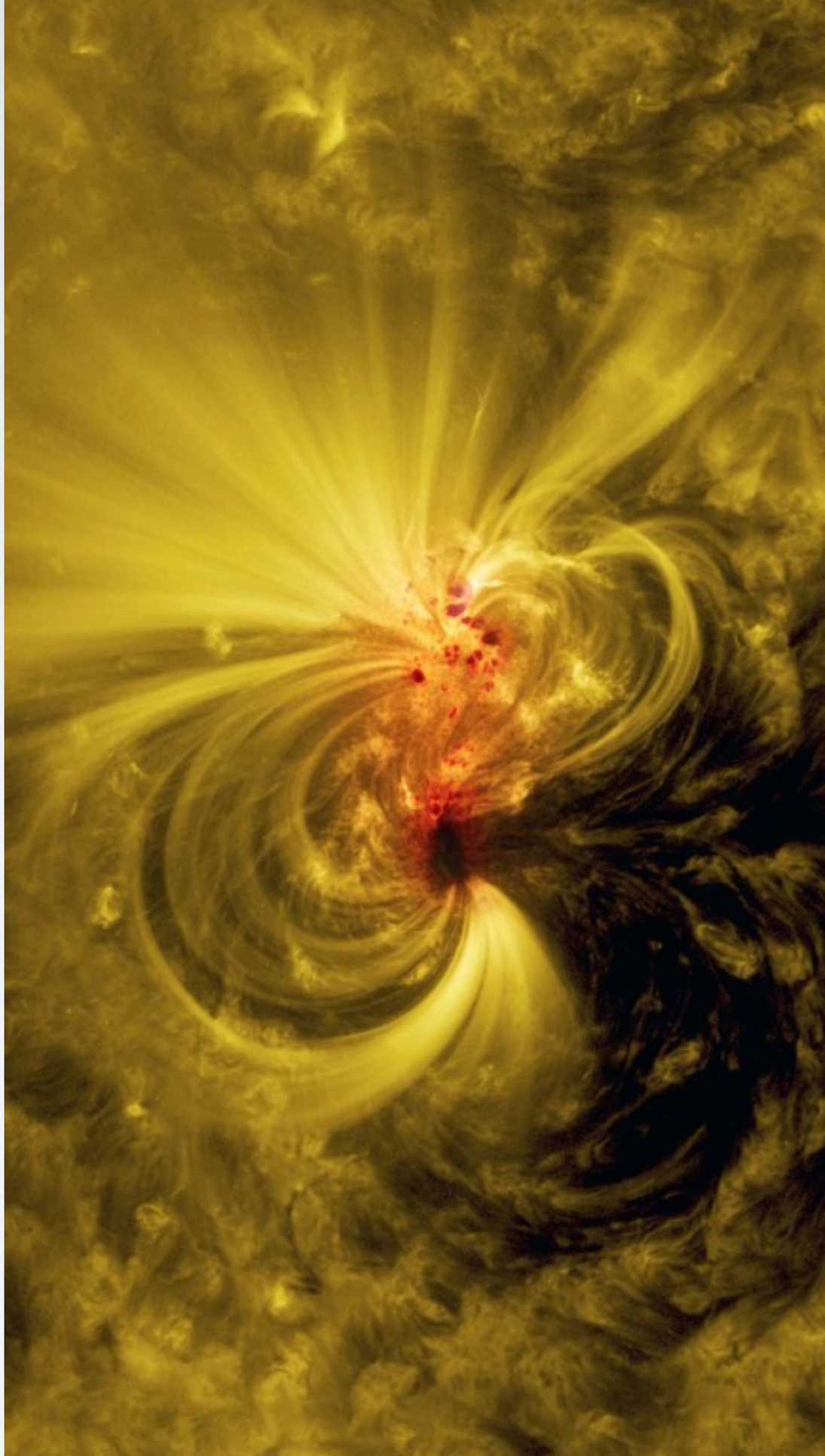
OSO2EINSTEIN



Vaiana et al (1981)

OUTLINE

- Moore's Law - growth in physically sophisticated numerical modeling
- Spectroscopic probes of heating mechanisms
- Coronal loop oscillations
- Thermal instabilities
- Flares and magnetic reconnection - Talk by Sofia Moscow (next!)
- Coronal abundances as probes of wave heating
- Stellar winds and coronal mass ejections - see also poster by Julian Alvarado-Gomez



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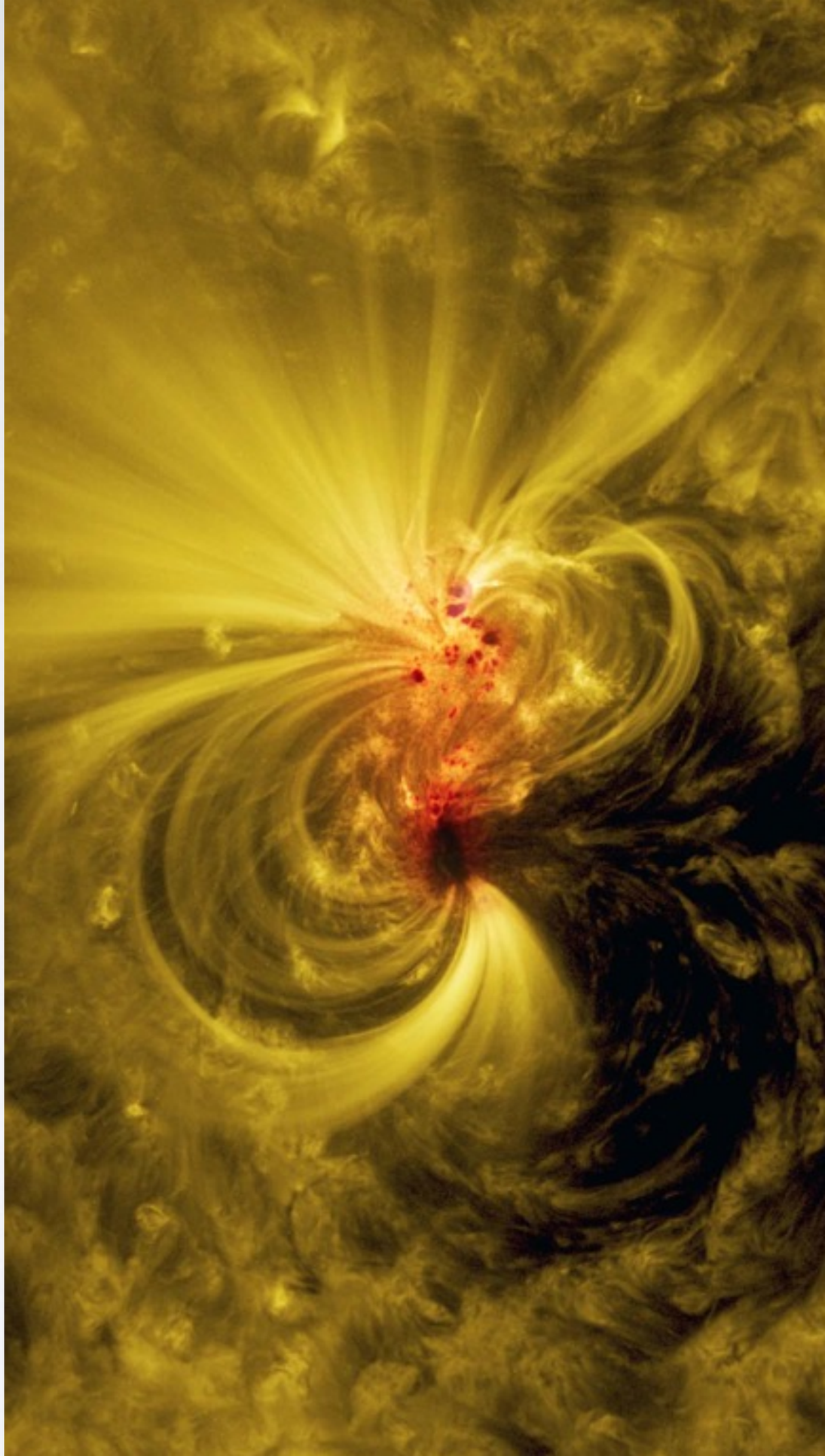


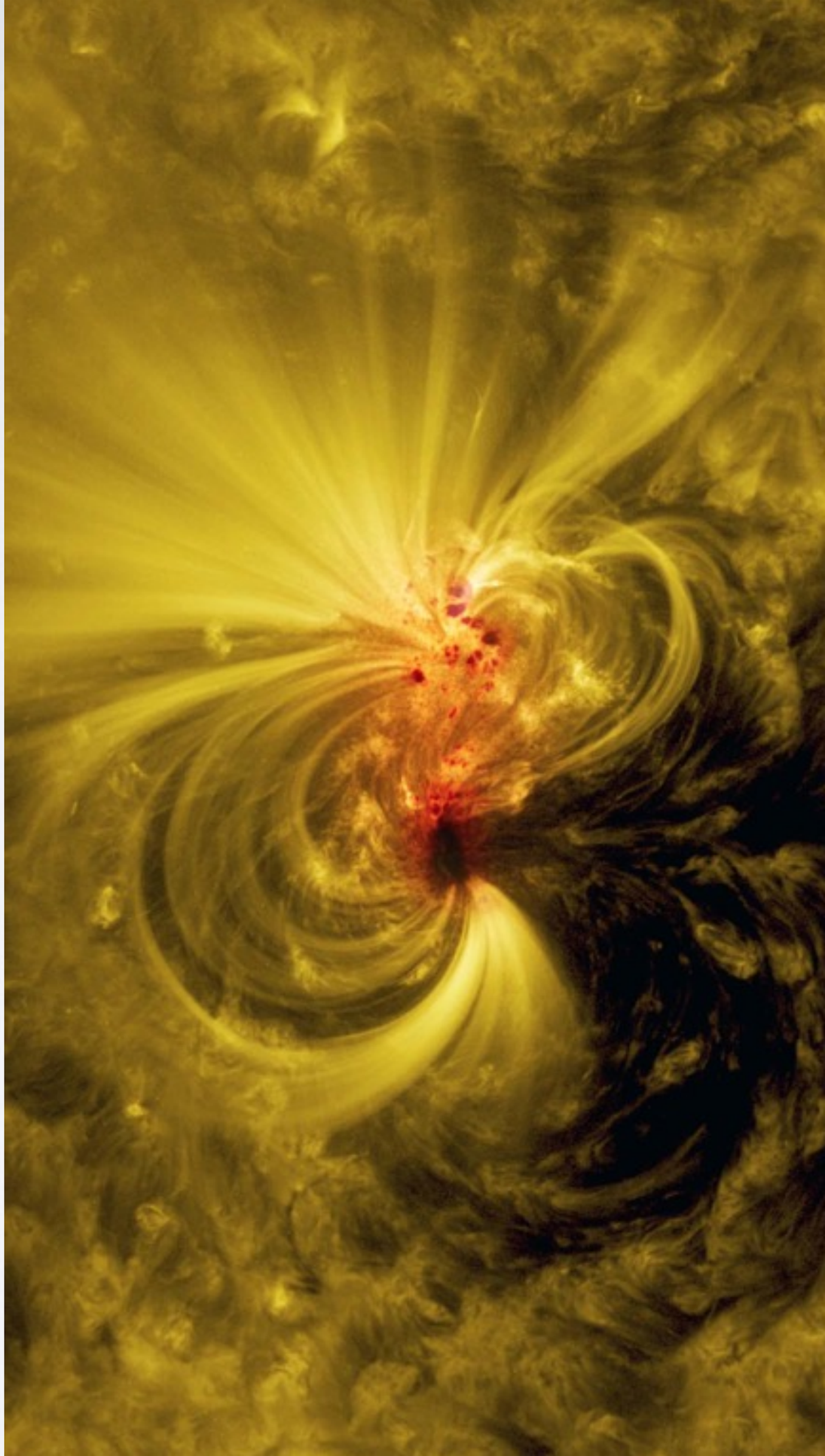
"CORONAL" PHYSICS

- Heating mechanism - MHD waves? magnetic reconnection (Parker "nanoflares")?

- Magnetic structure - loop fine/ sub-structure? braiding?

- Energy transport: photosphere - corona - photosphere

- Open (wind) vs closed corona



UNIVERSAL PHYSICS

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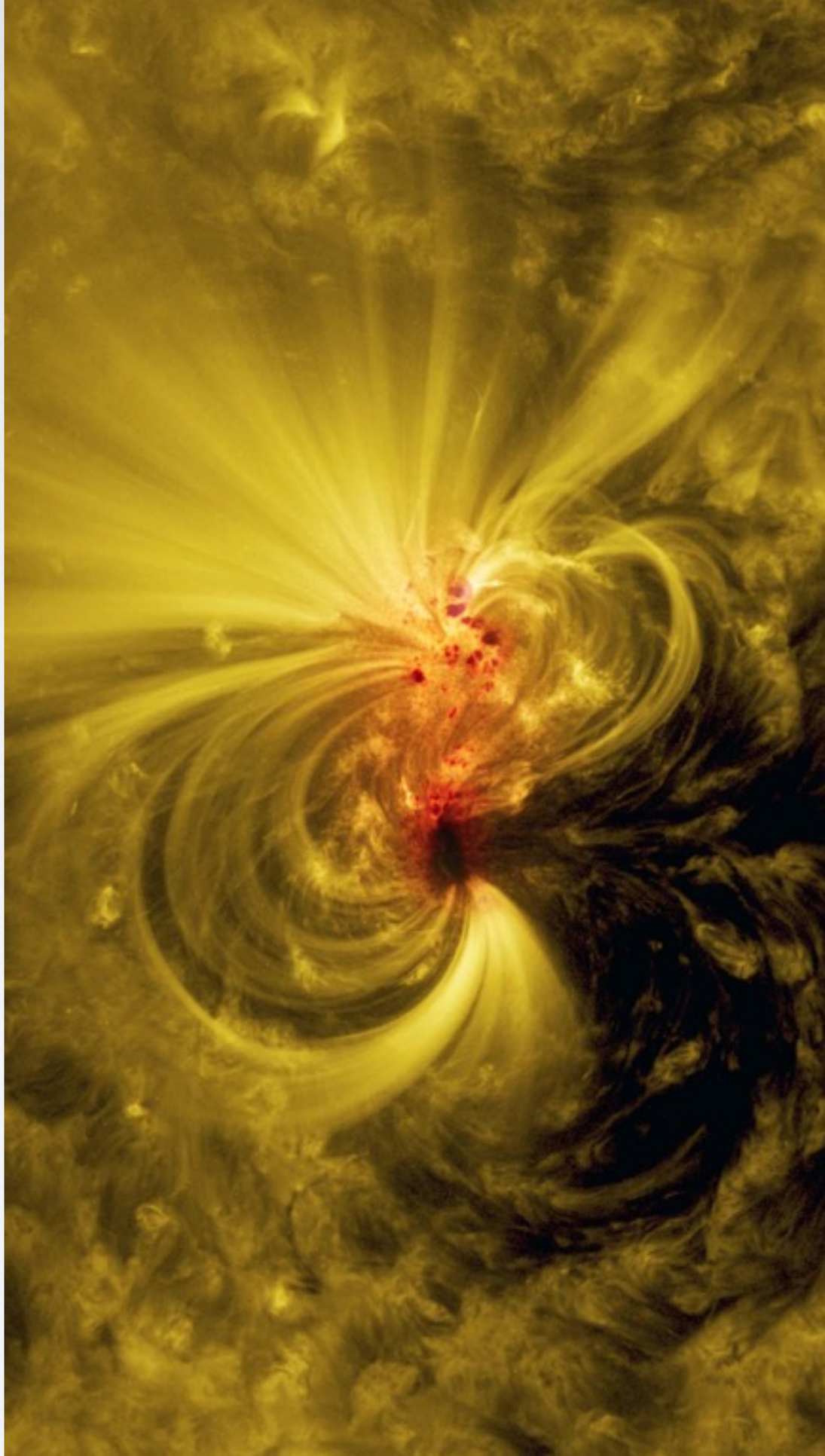
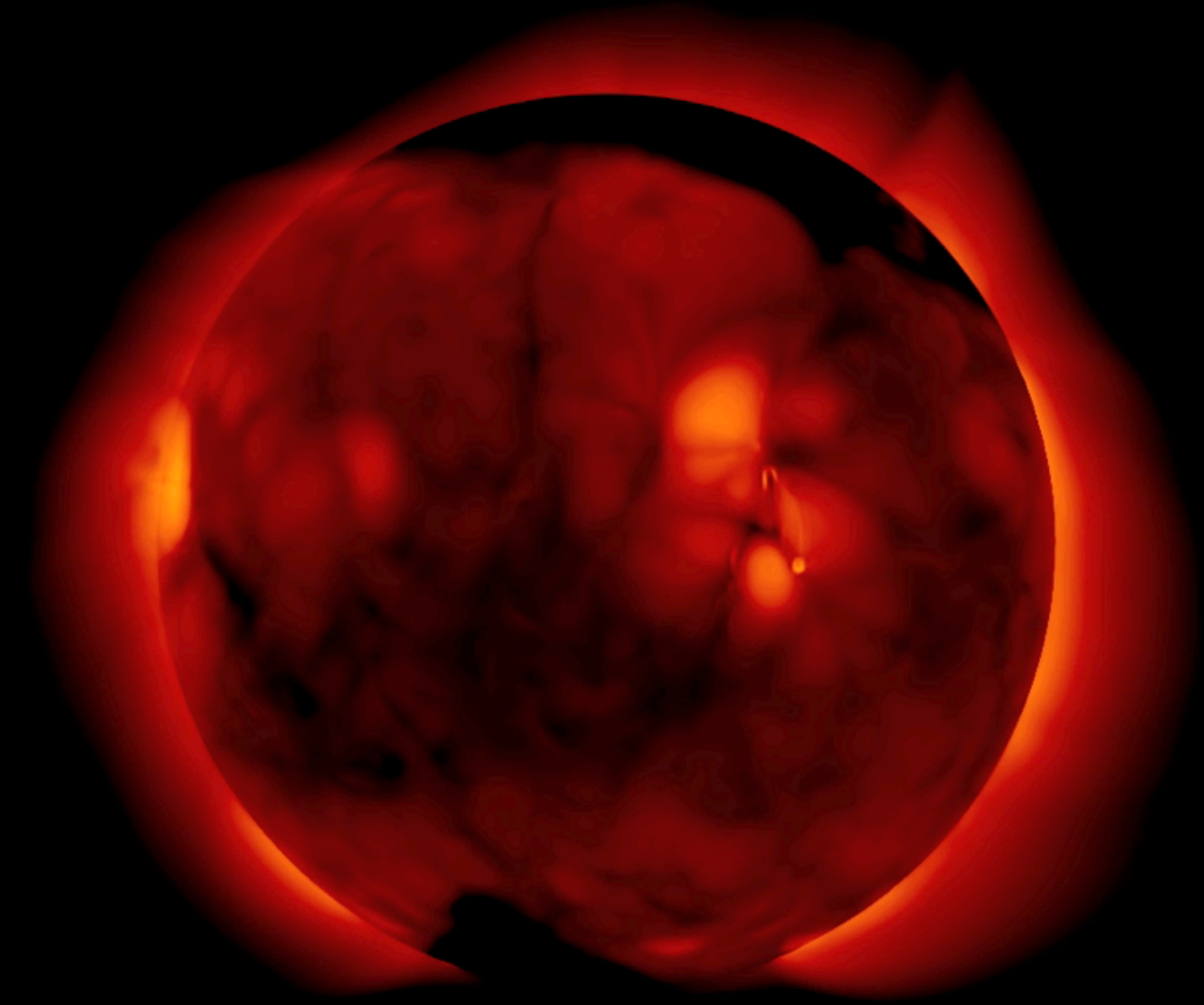


LYNX OVER ATHENA

- Mirror resolution

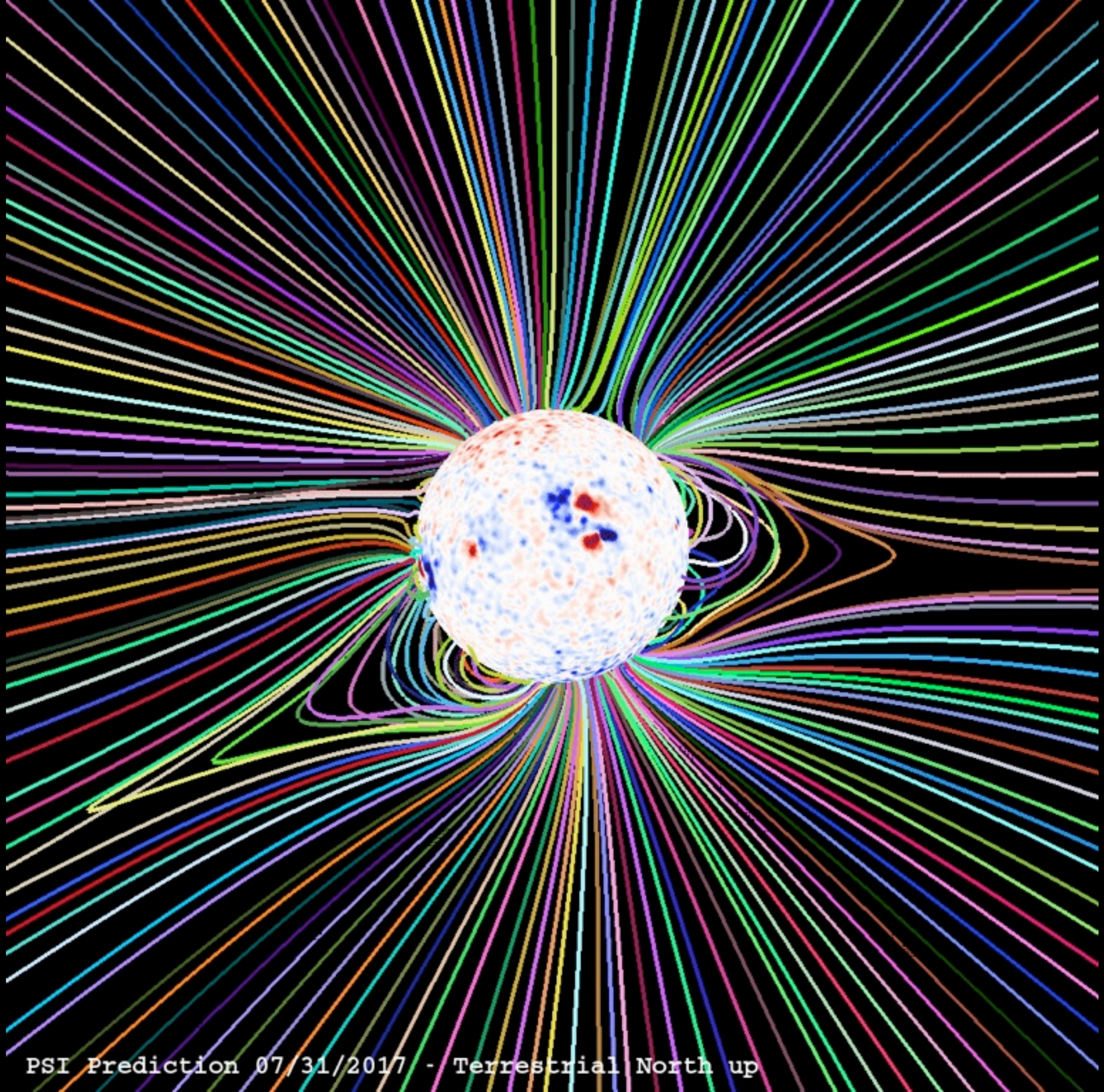
→ soft X-ray dispersive spectral resolution (<~ 50 km/s; R~10,000 represents major breakthrough)

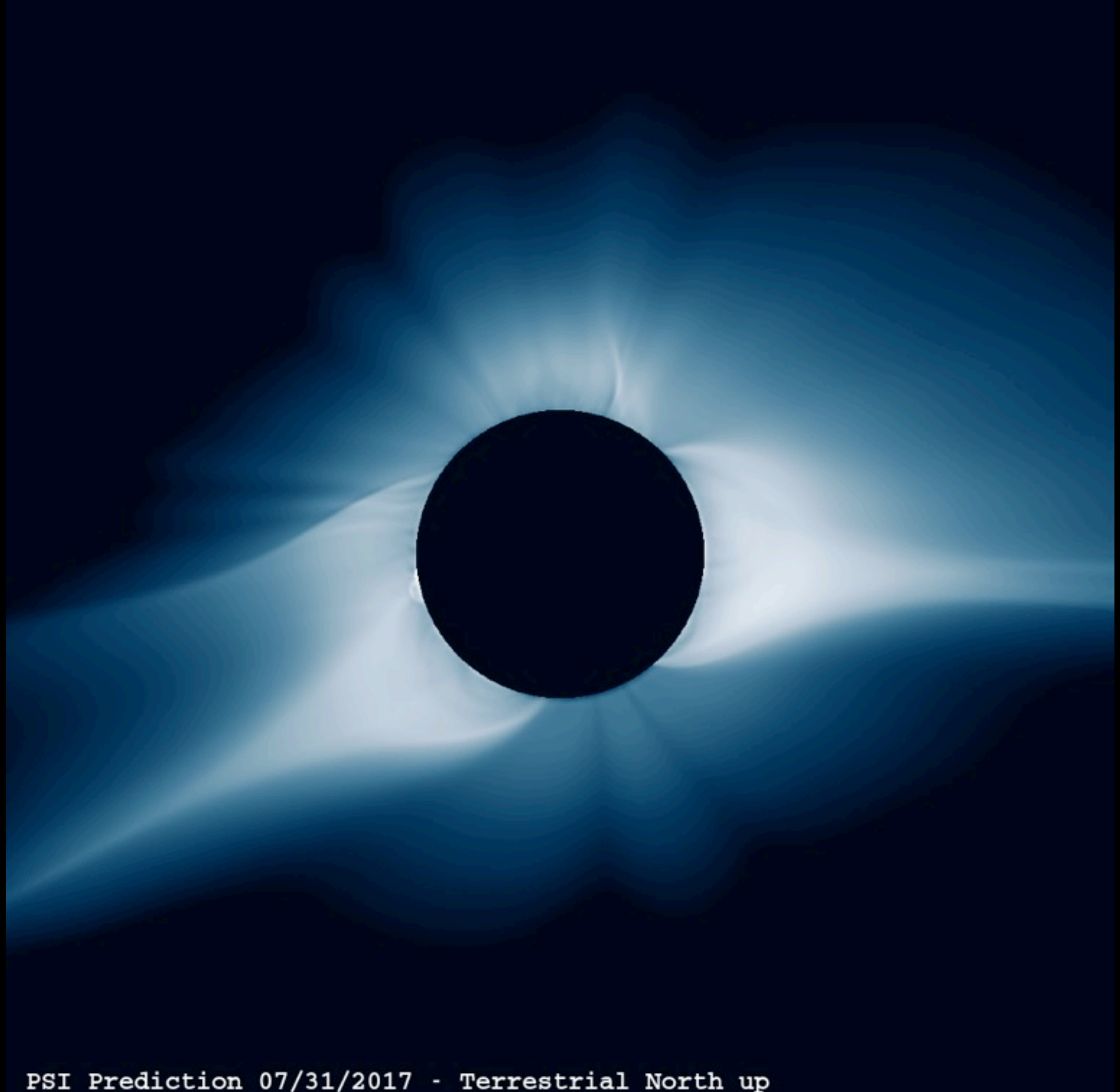
→ charge exchange X-rays from stellar winds



290.7

XRT TiPoly

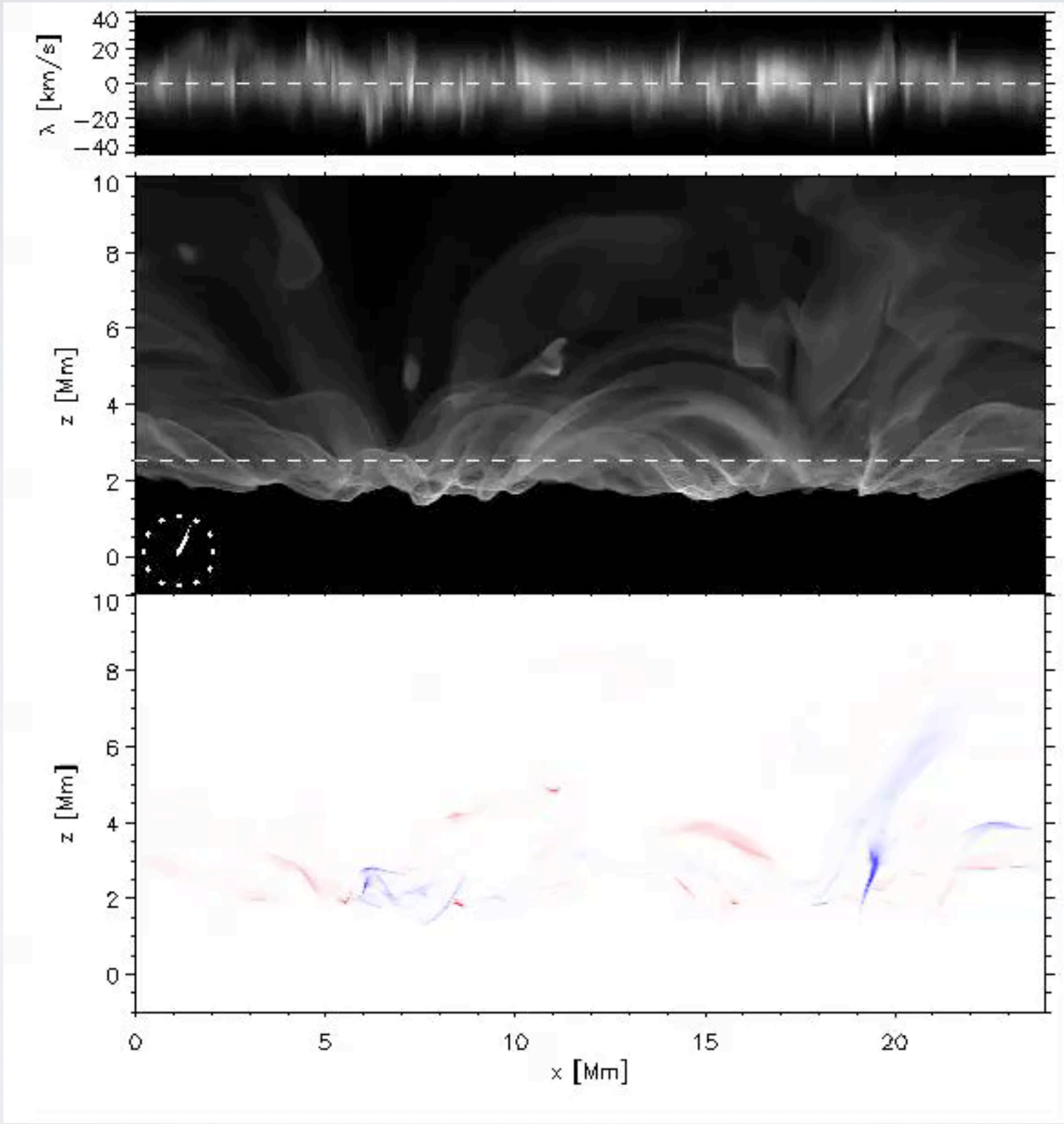

PSI Prediction 07/31/2017 - Terrestrial North up



PSI Prediction 07/31/2017 - Terrestrial North up

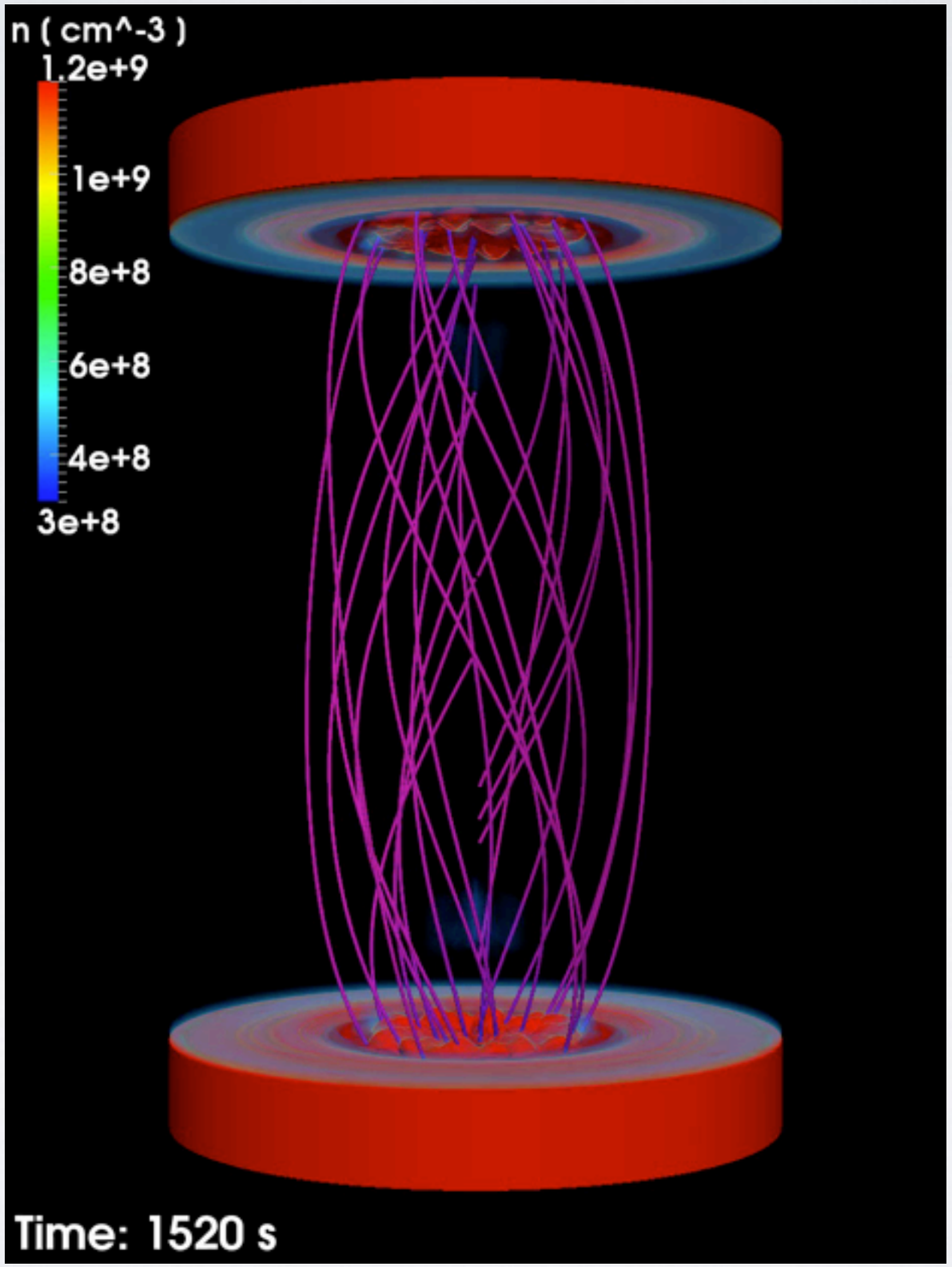
CORONA IN A COMPUTER

Hansteen et al (2014)



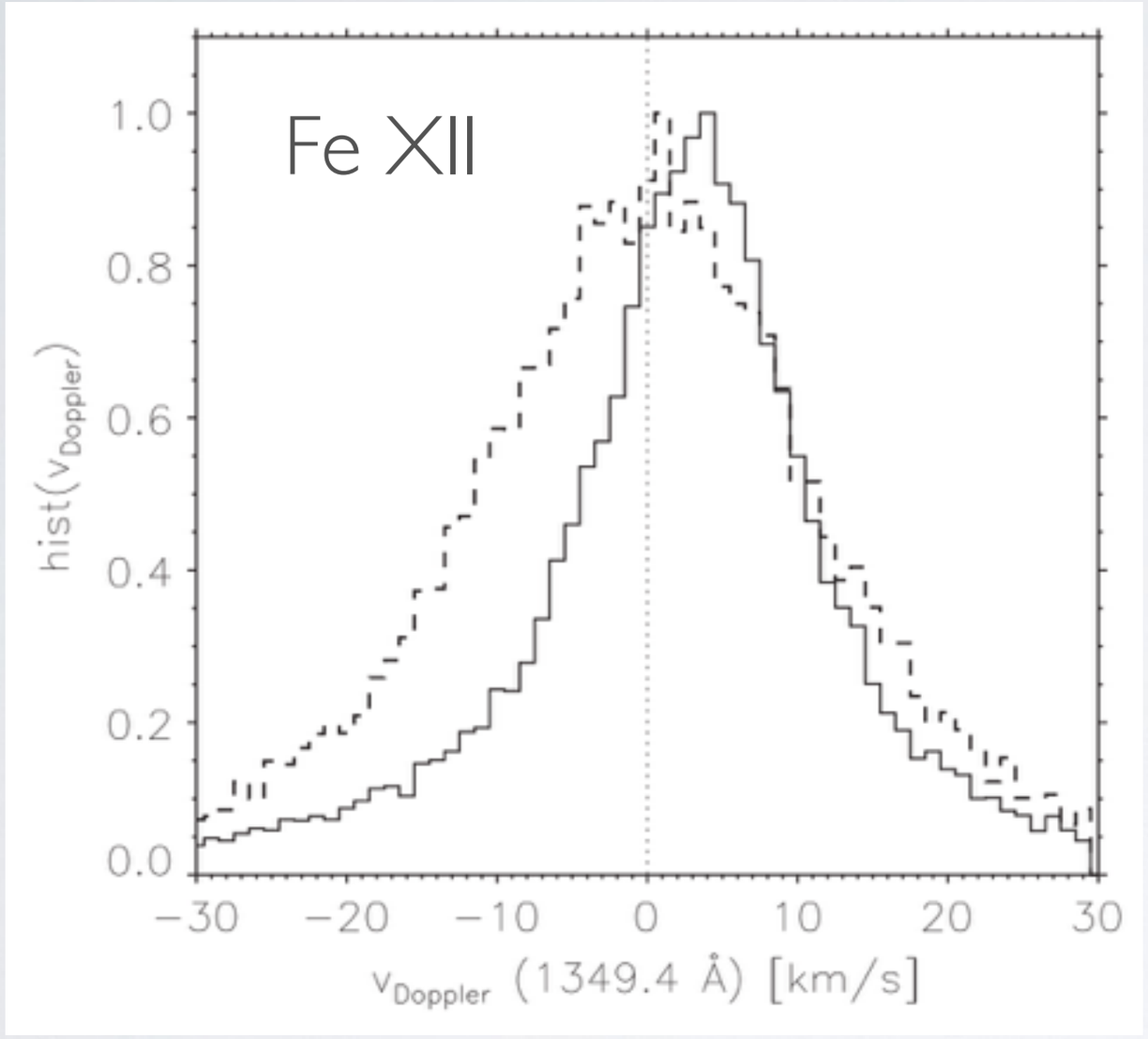
BIFROST simulation

CORONA IN A COMPUTER

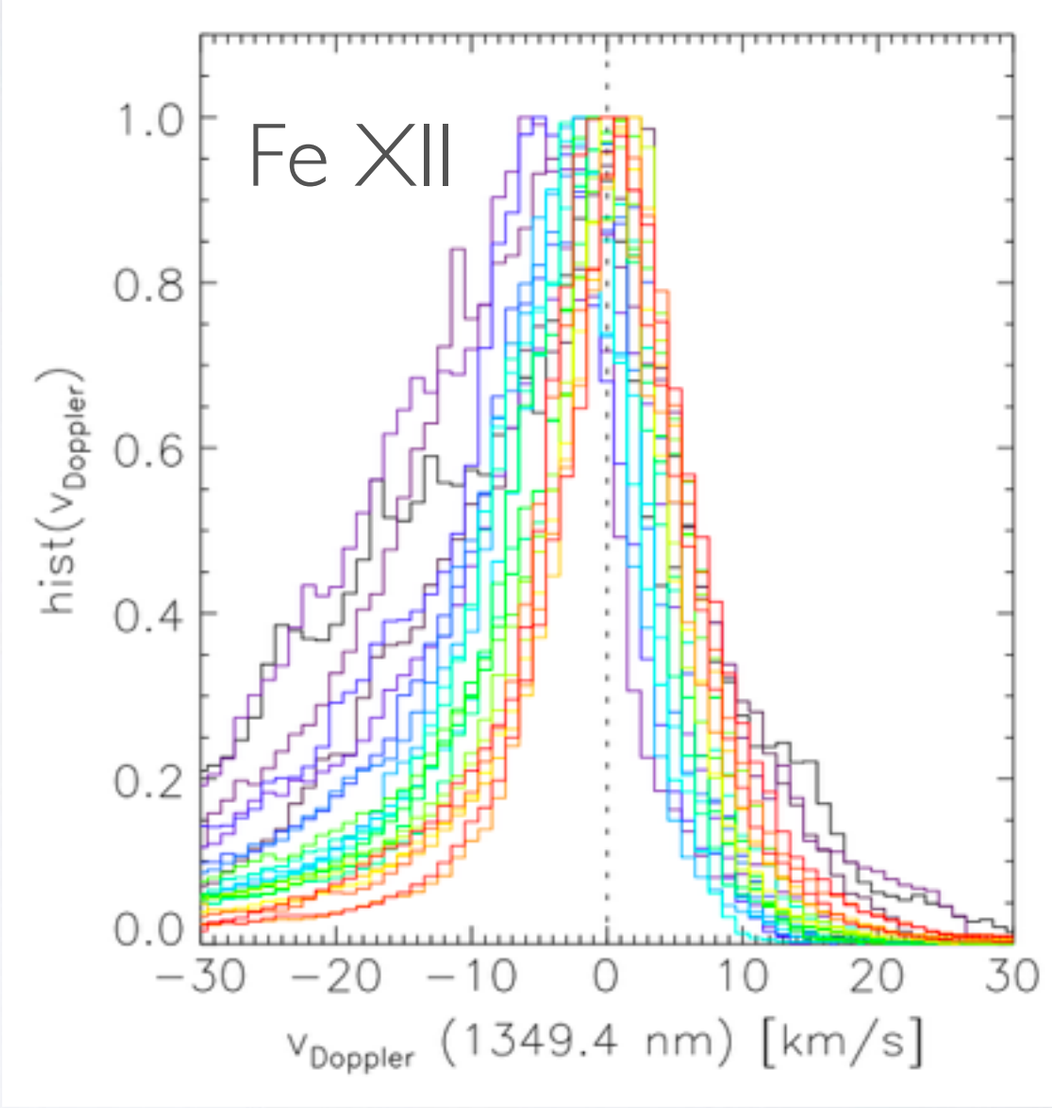


Reale et al. (2016)

CORONA IN A COMPUTER

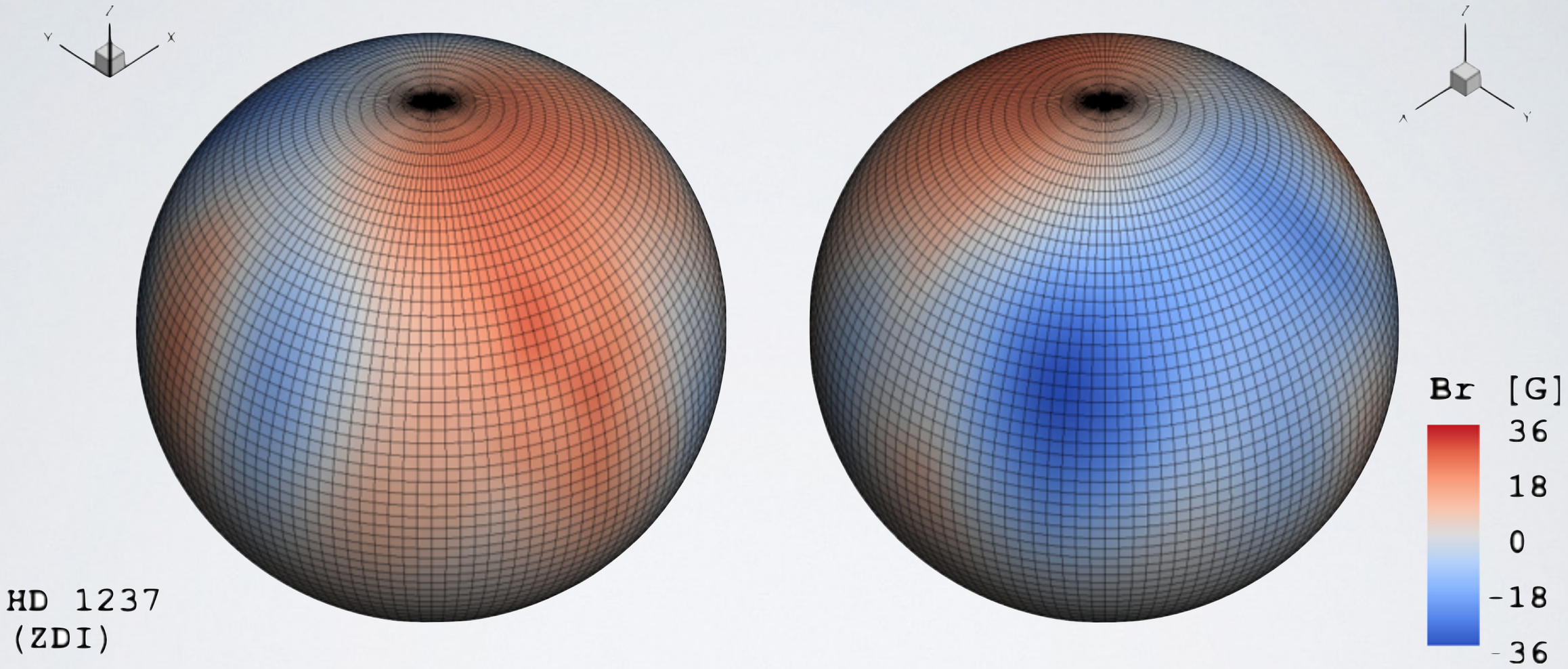


IRIS



Bifrost 3D

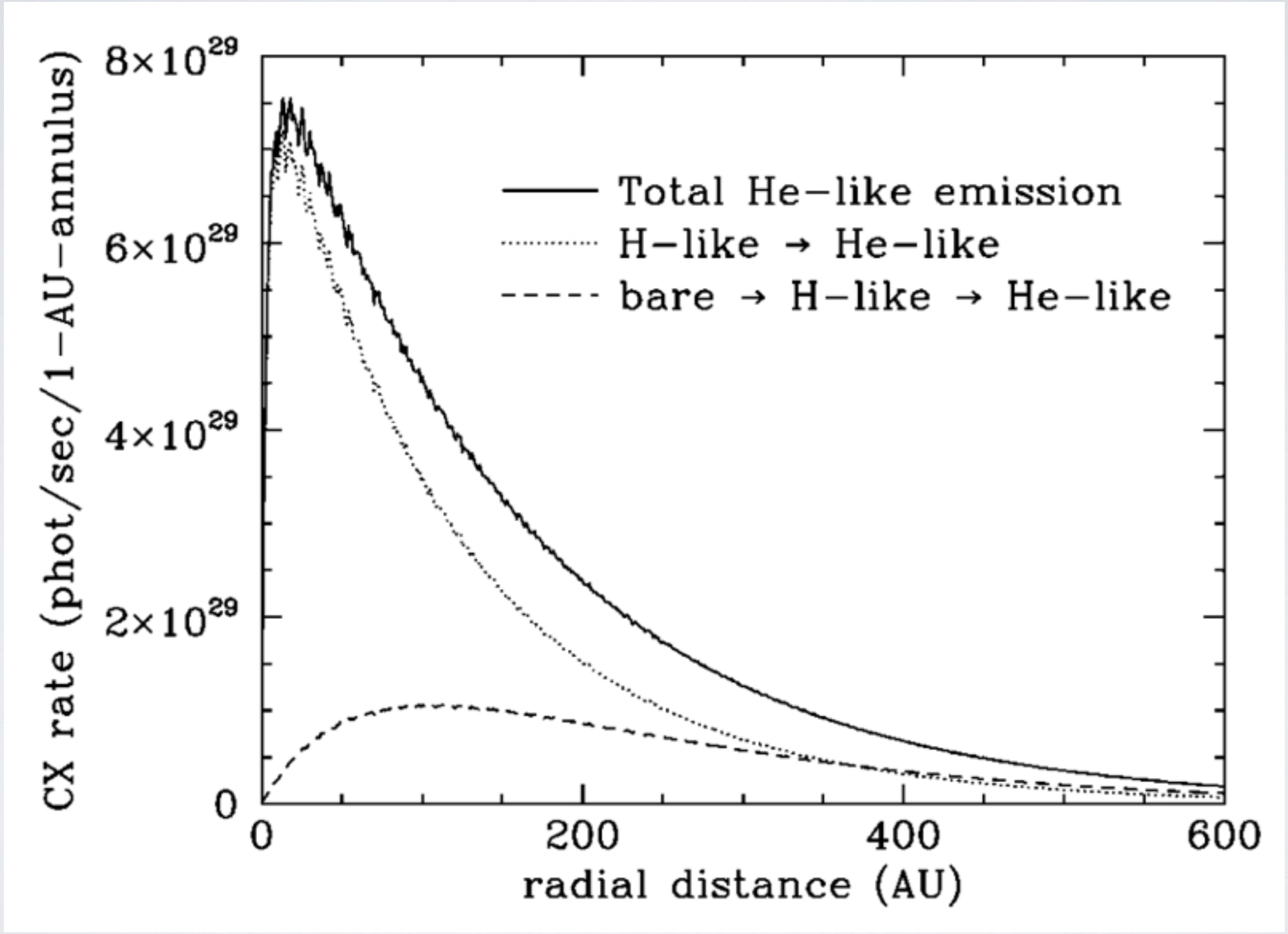
Testa et al.
(2016)



Alvarado-Gomez et al (2016)

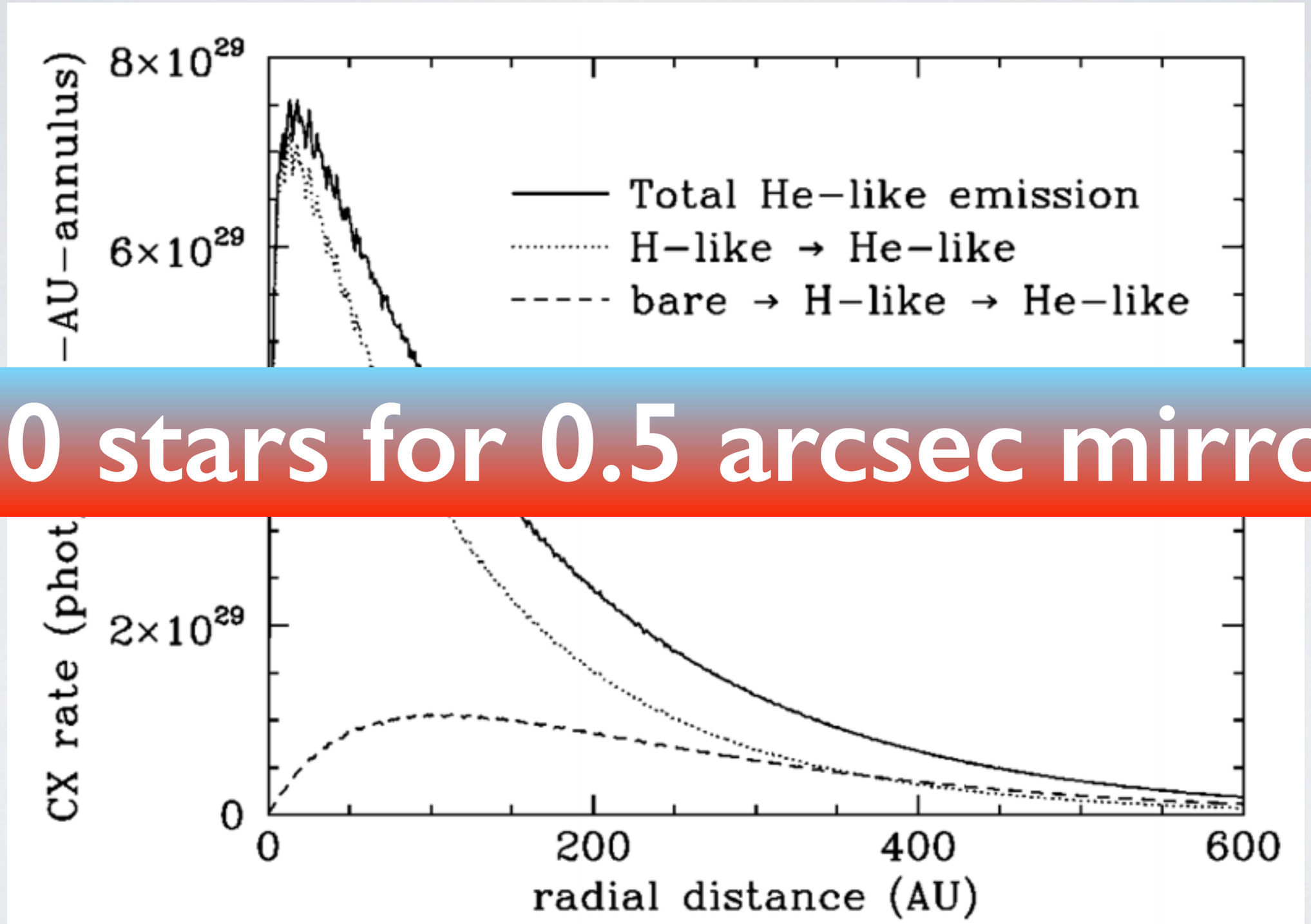
Alvarado-Gomez et al (2016)

DIRECT DETECTION OF STELLAR WINDS



Wargelin & Drake (2001)

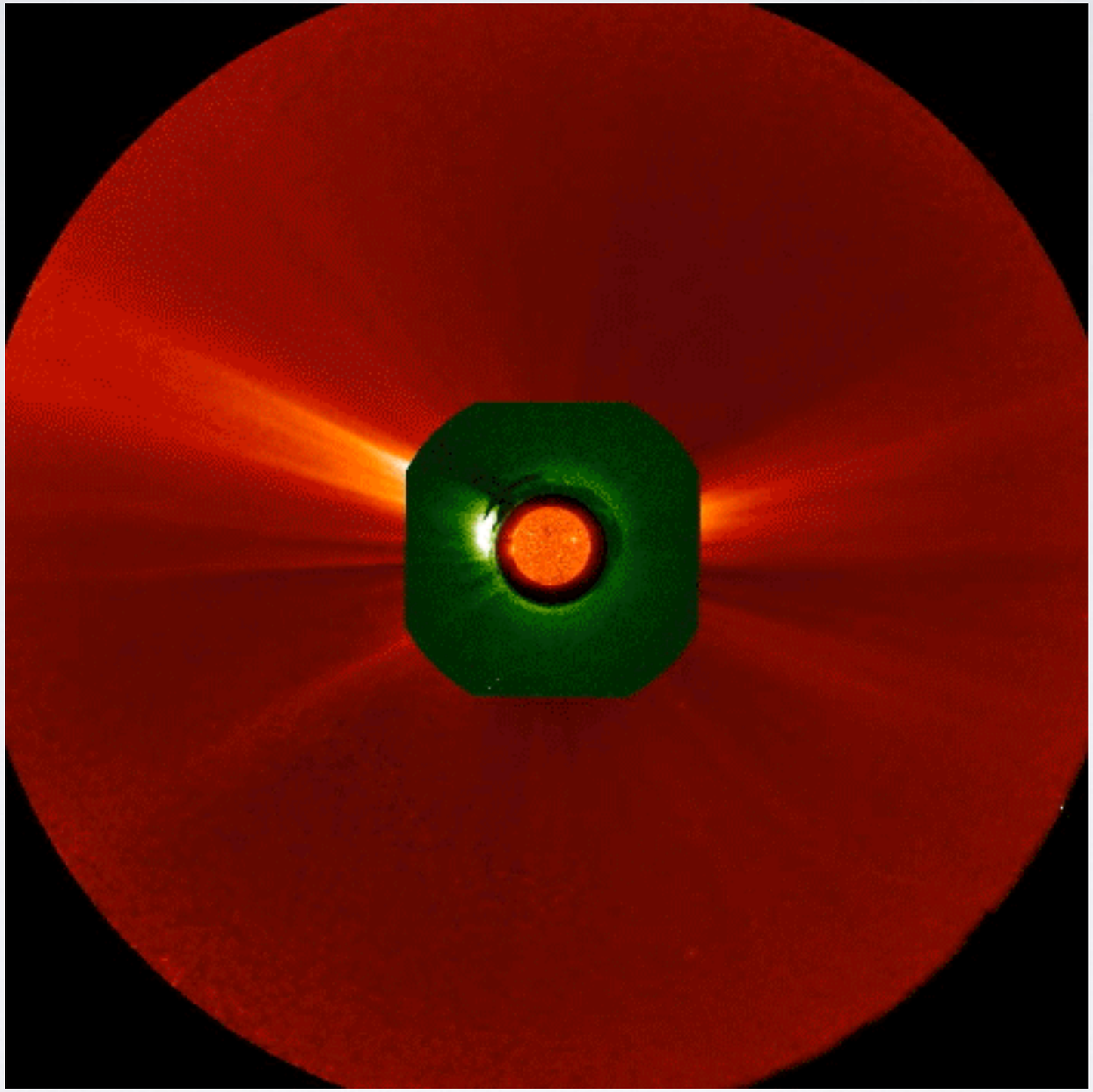
DIRECT DETECTION OF STELLAR WINDS



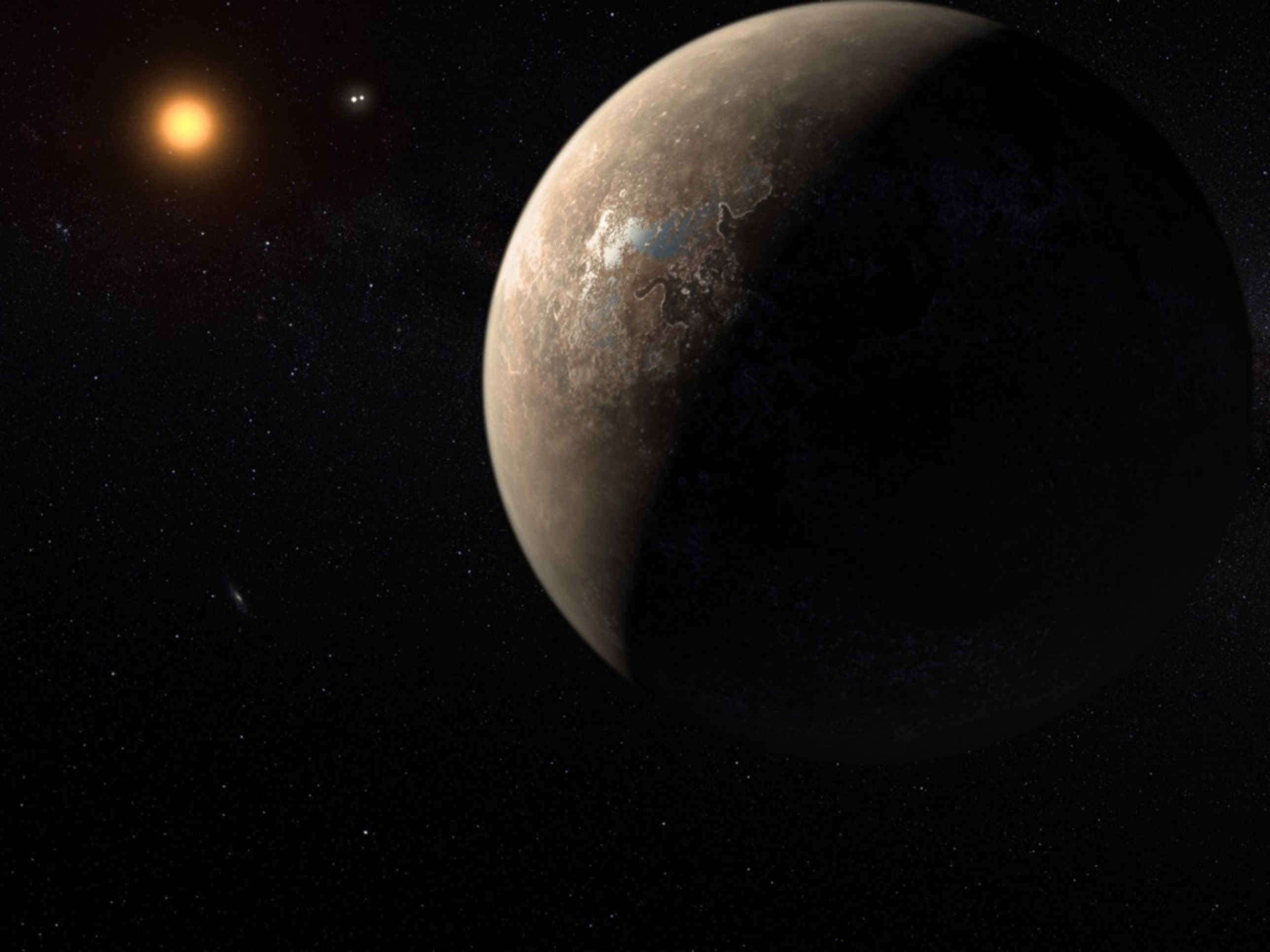
~20 stars for 0.5 arcsec mirrors

Wargelin & Drake (2001)

DIRECT DETECTION OF CMES?

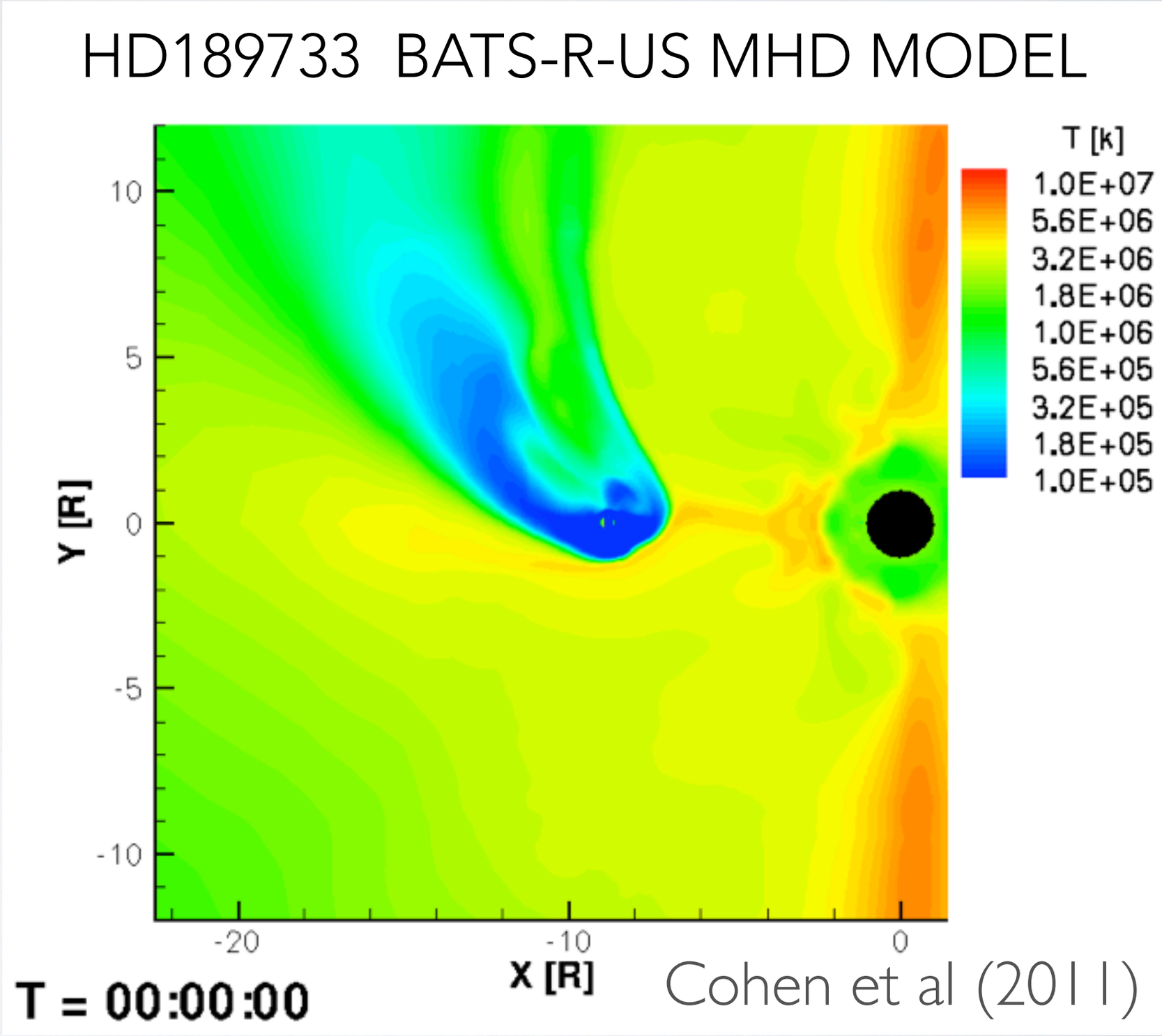


July 23 2017



HAZARDS OF CMES FOR CLOSE-IN PLANETS

- Model of solar event of May 13 2005, v=1700 km/s
- Outer atmosphere swept away by CME impact



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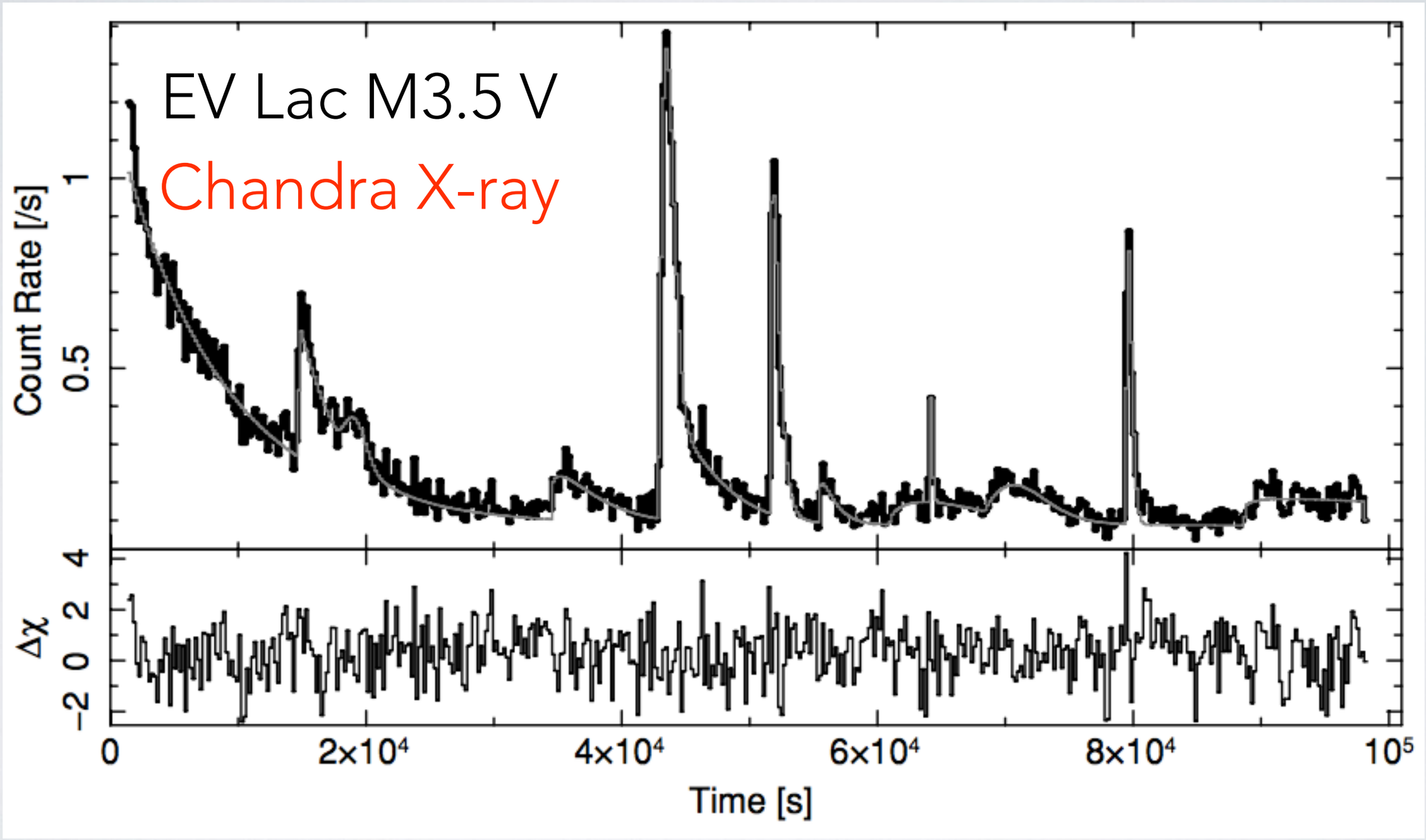
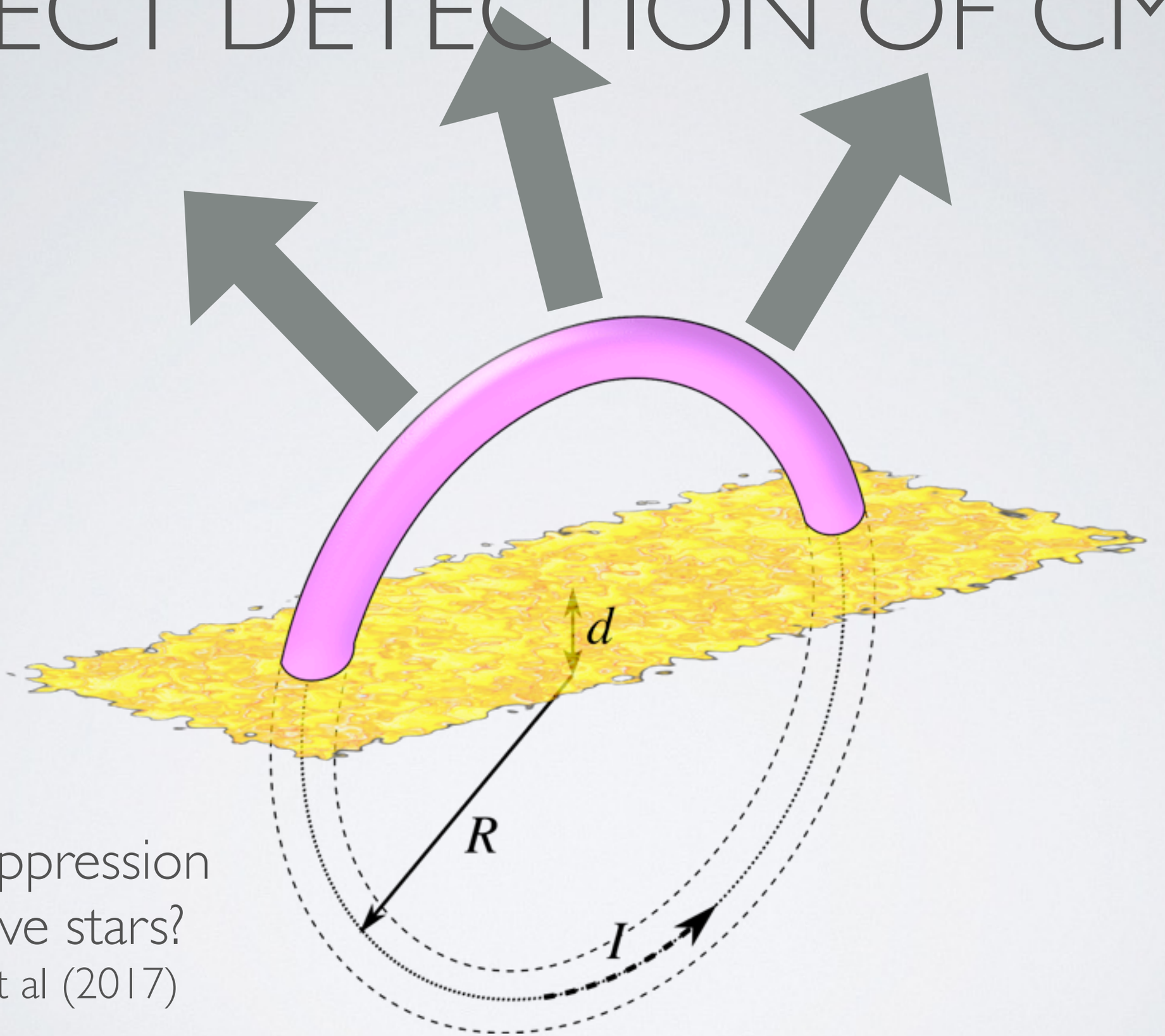


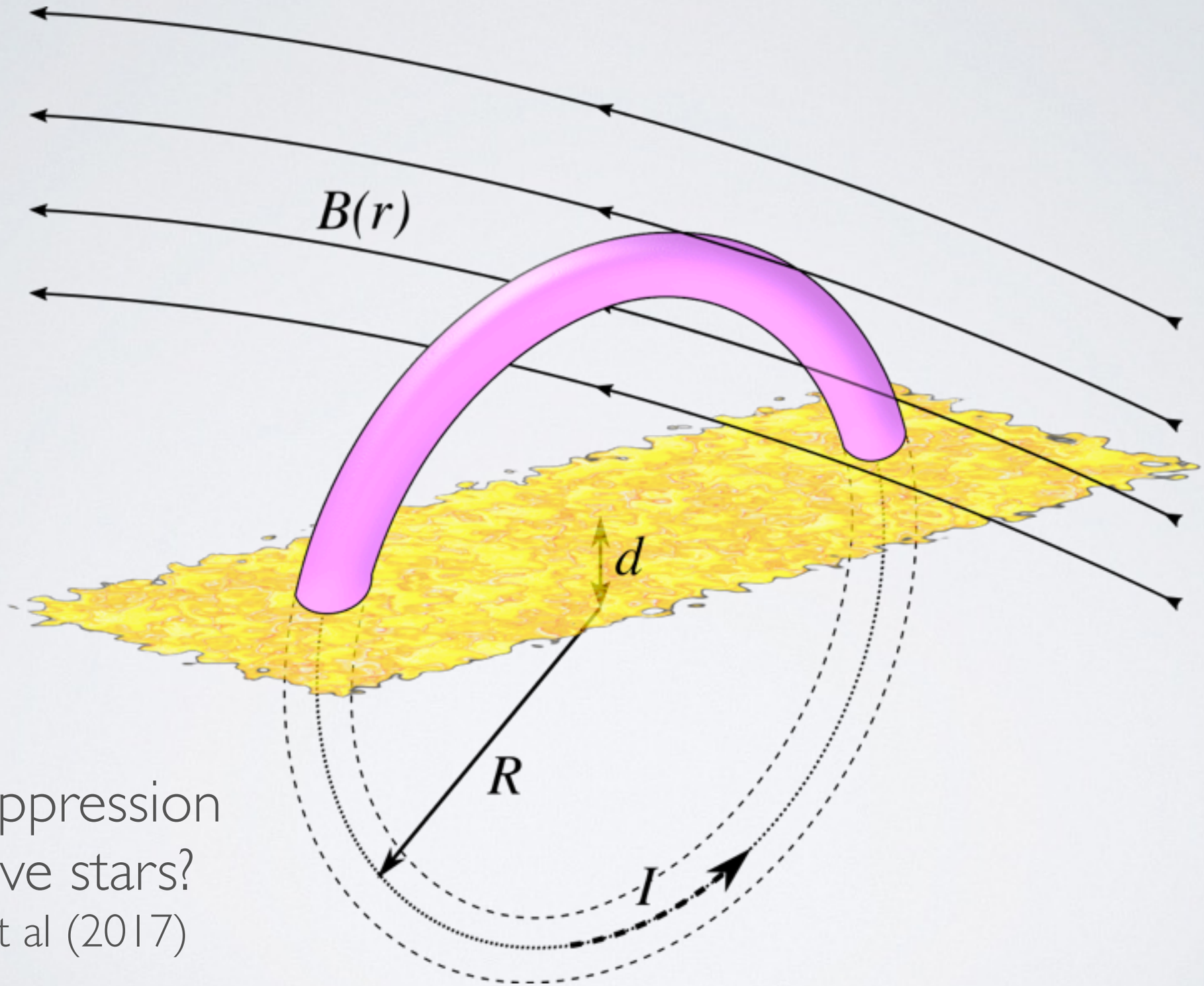
Huenemoerder et al (2010)

DIRECT DETECTION OF CMES?



CME suppression
on active stars?
Drake et al (2017)

DIRECT DETECTION OF CMES?



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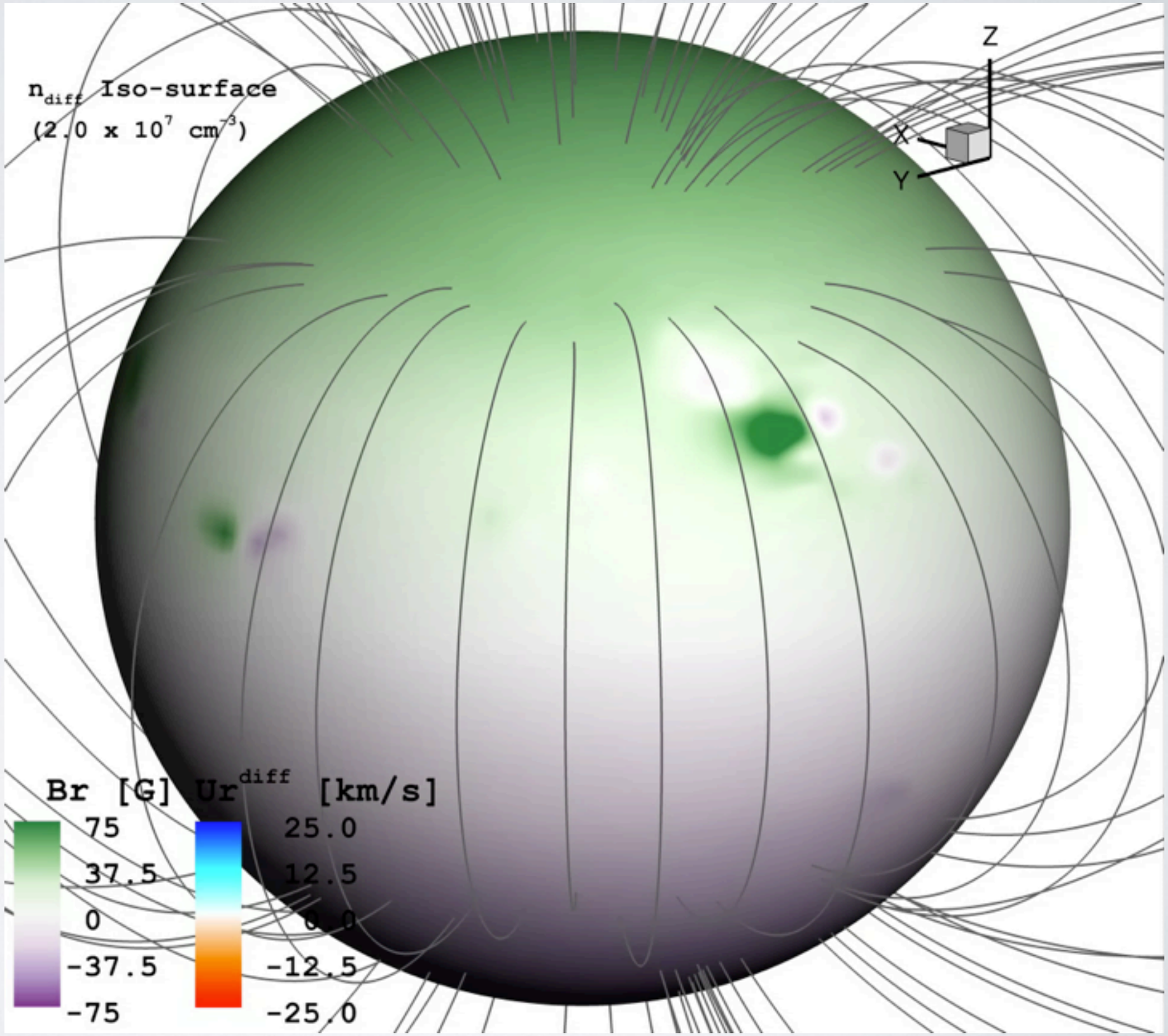
Alvarado-Gomez et al. (2018)



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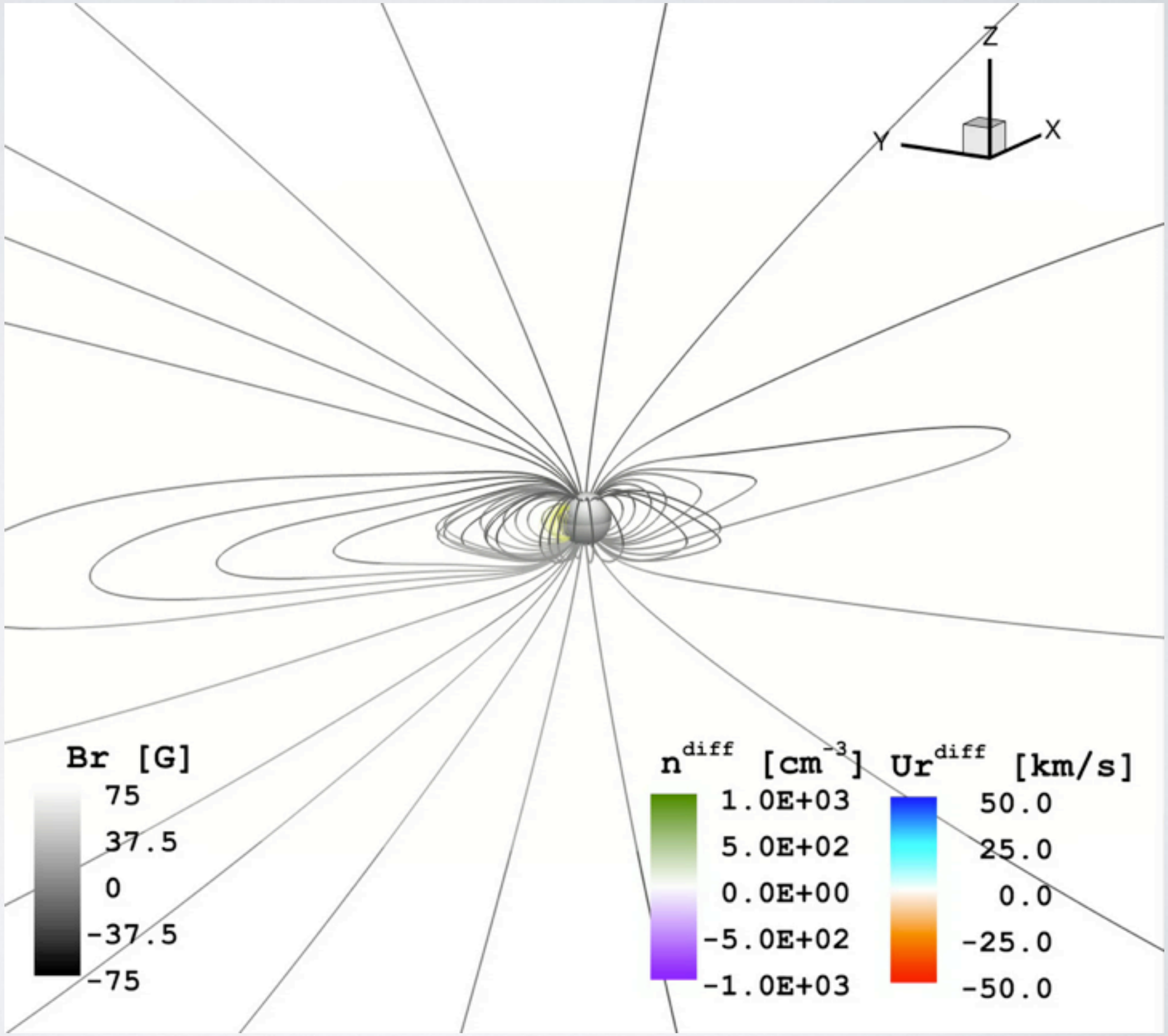

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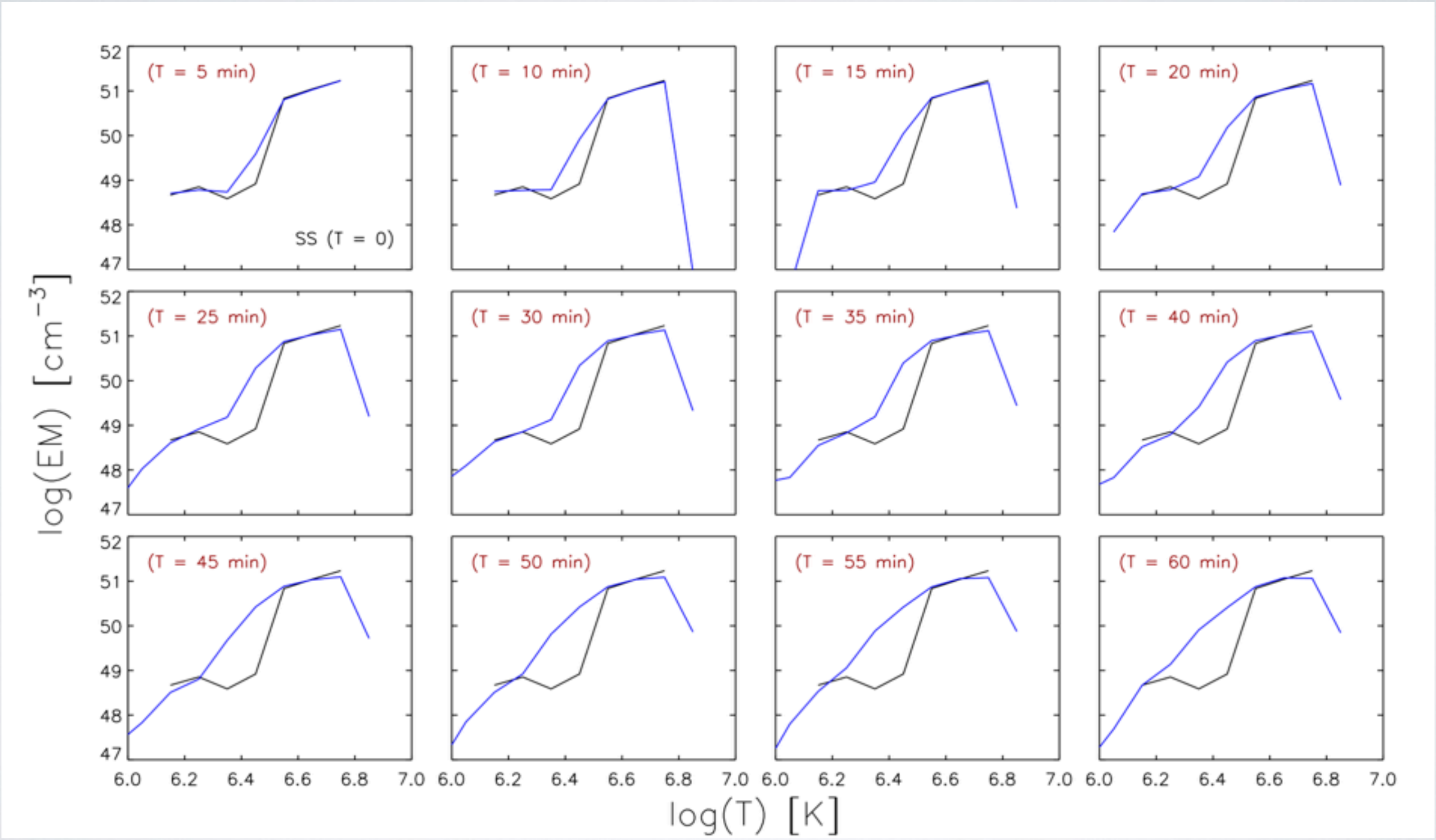


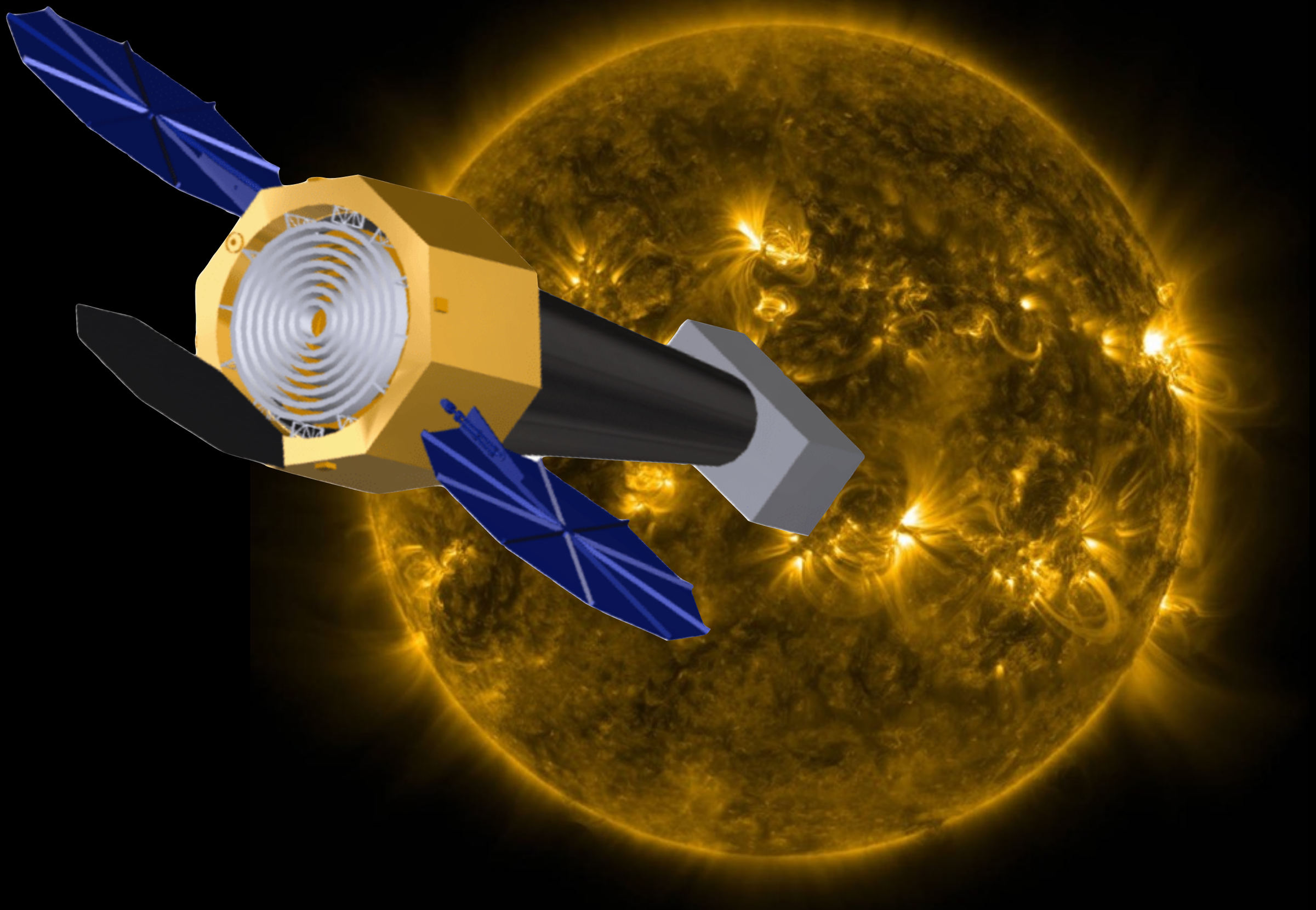
Alvarado-Gomez et al (2018)

SUMMARY

- Much of coronal physics lies in understanding Doppler shifts of similar magnitude to the thermal width (few 10's of km/s).

- Lynx observations of stars will provide different underlying parameters and new stringent tests of physics built into comprehensive numerical models.

- Results will be important for understanding life, the Universe and everything.



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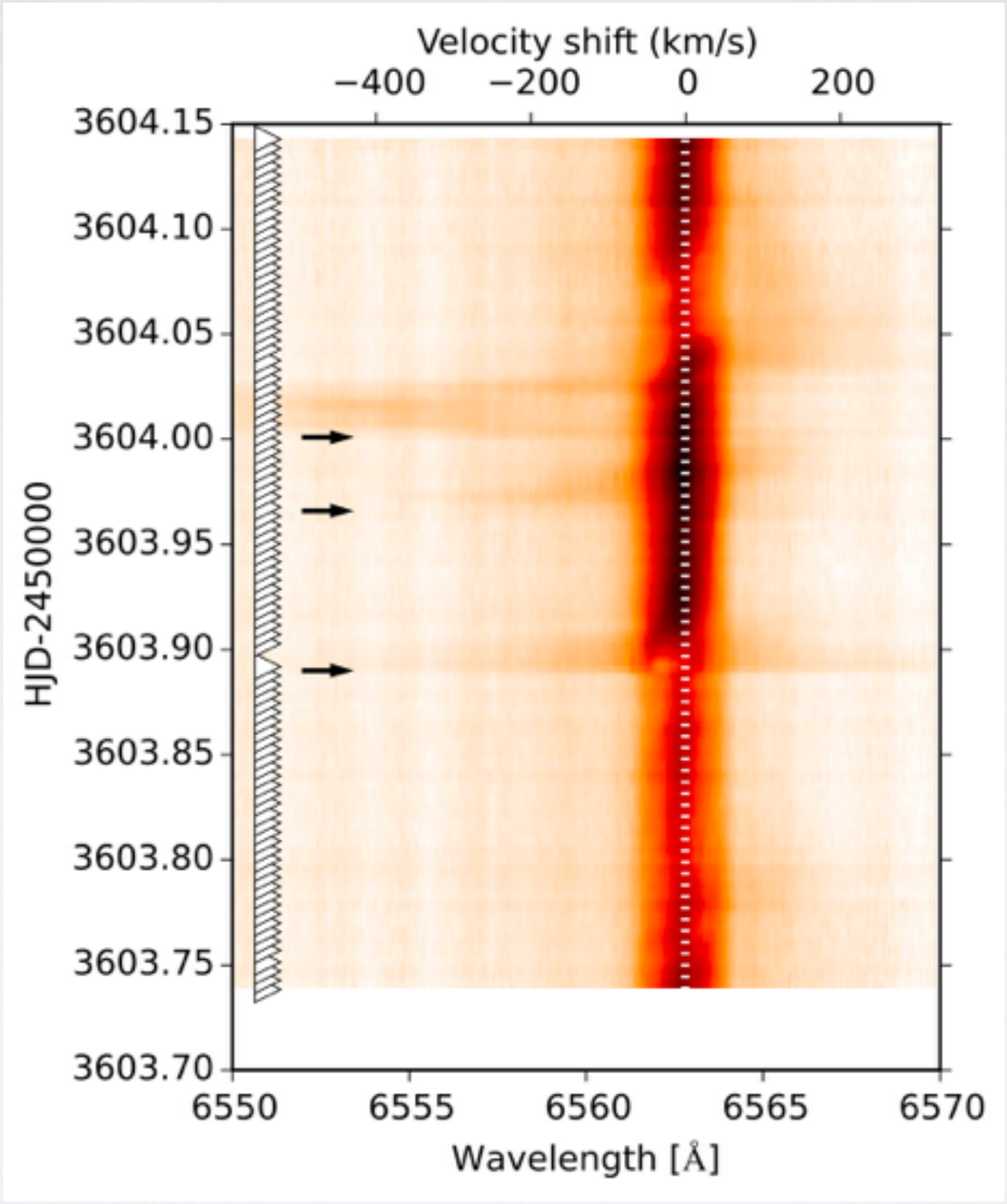

V734 Peg (Olah et al 2016)

DIRECT DETECTION OF CMES?

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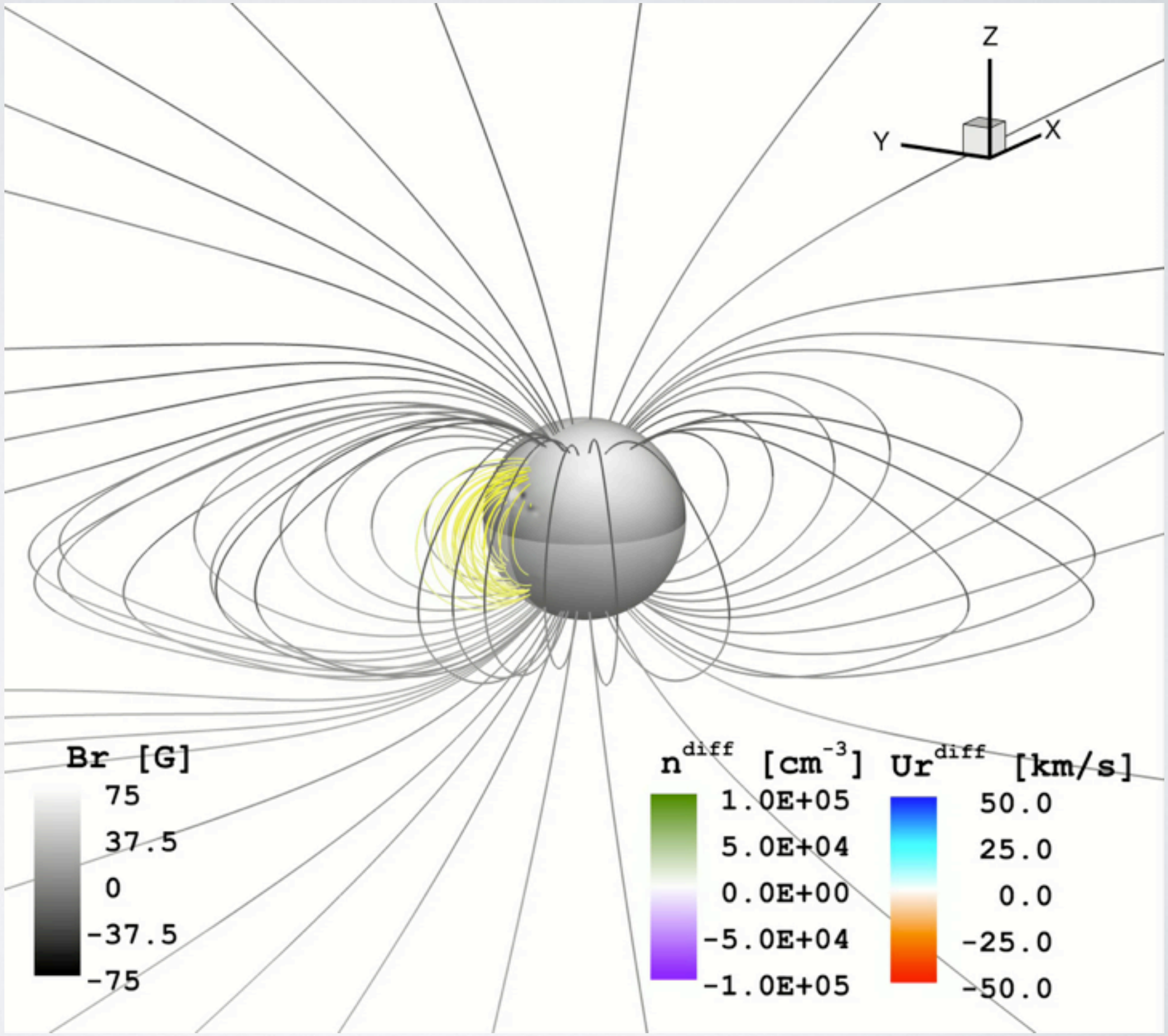

CORONA IN A COMPUTER