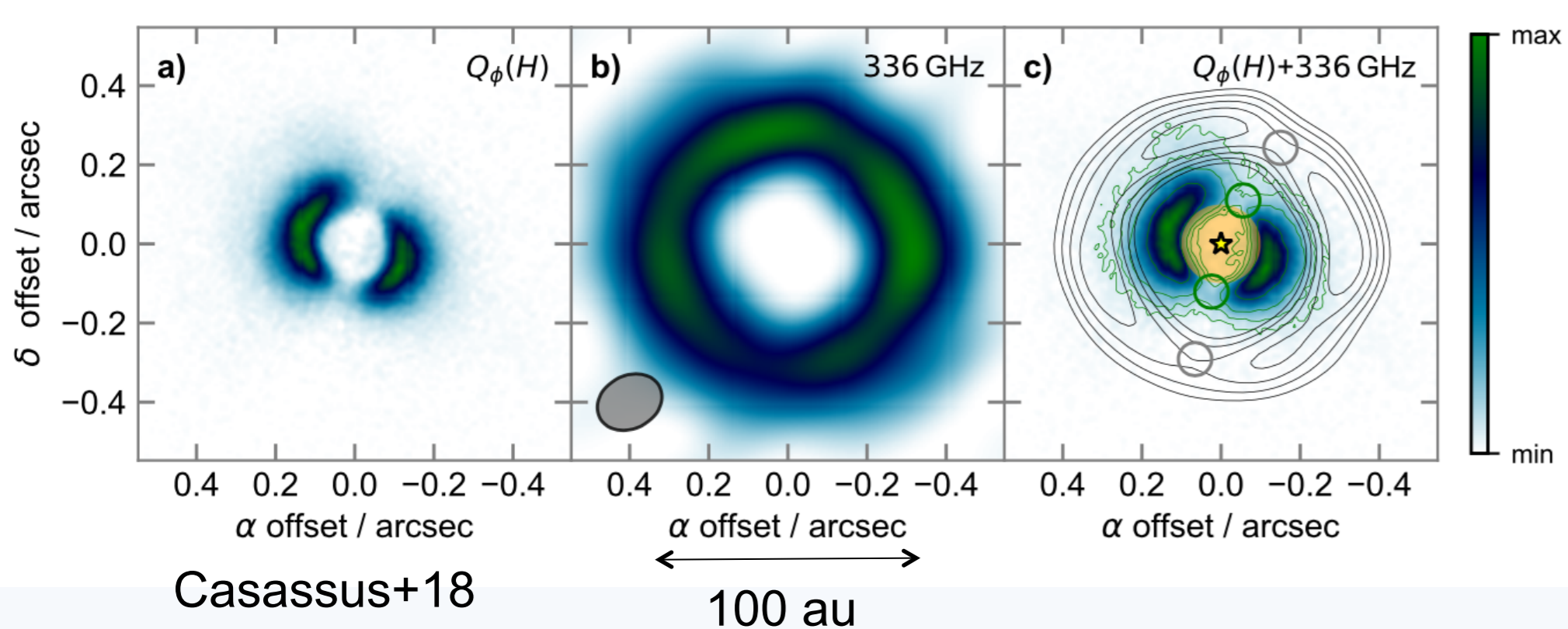


Probing the magnetospheric accretion region of the young system DoAr 44 using VLT/GRAVITY

Jérôme Bouvier, Karine Perraut, Evelyne Alecian, and the SPIDI team
IPAG, Grenoble

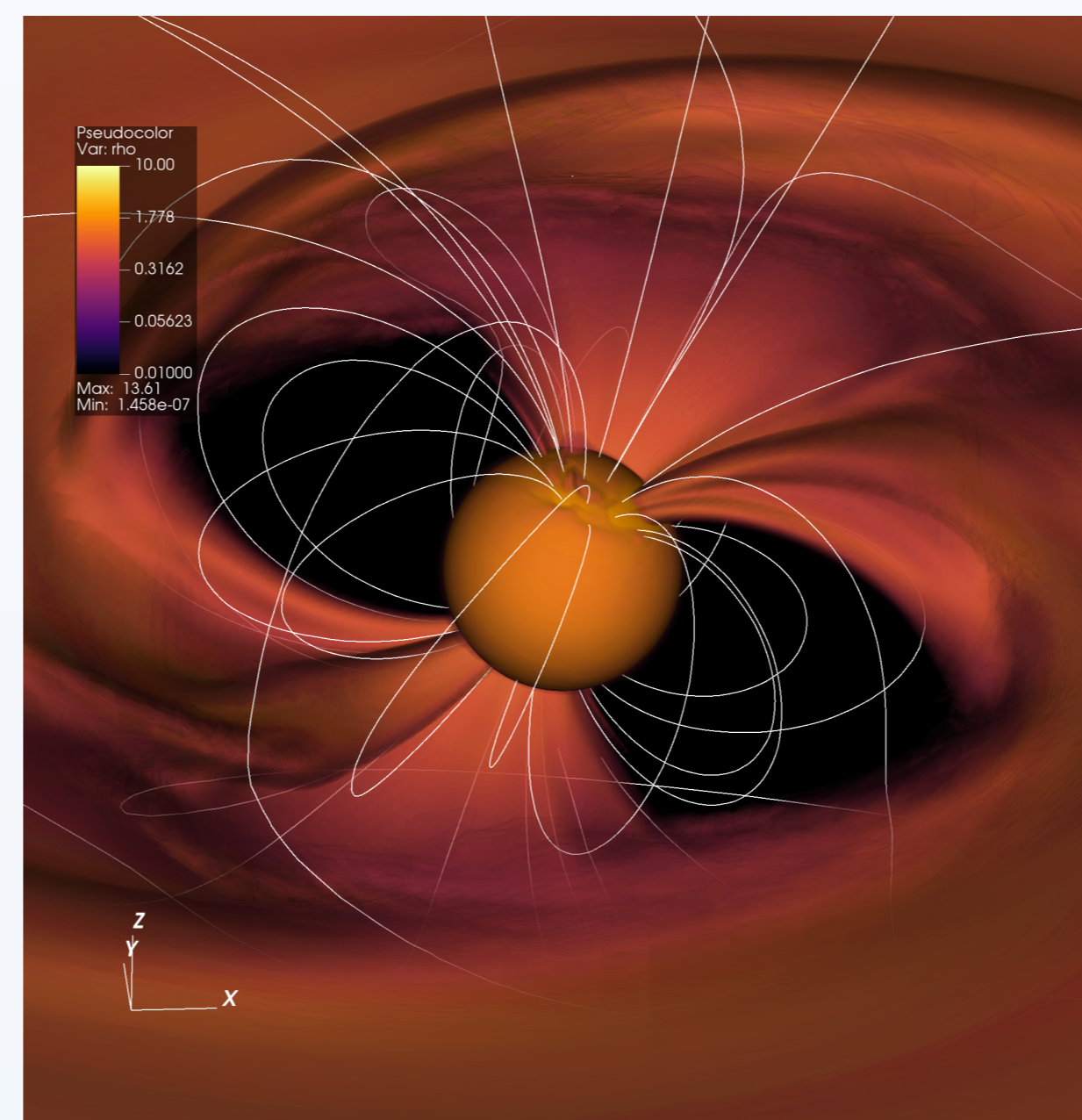
DoAr 44: a transition disk system



- A young stellar system in the Rho Oph cloud
- Surrounded by an outer ring with shadows
- Accreting from a compact inner disk
- Suspected inner-outer disk misalignment

Magnetospheric accretion: 3D MHD models

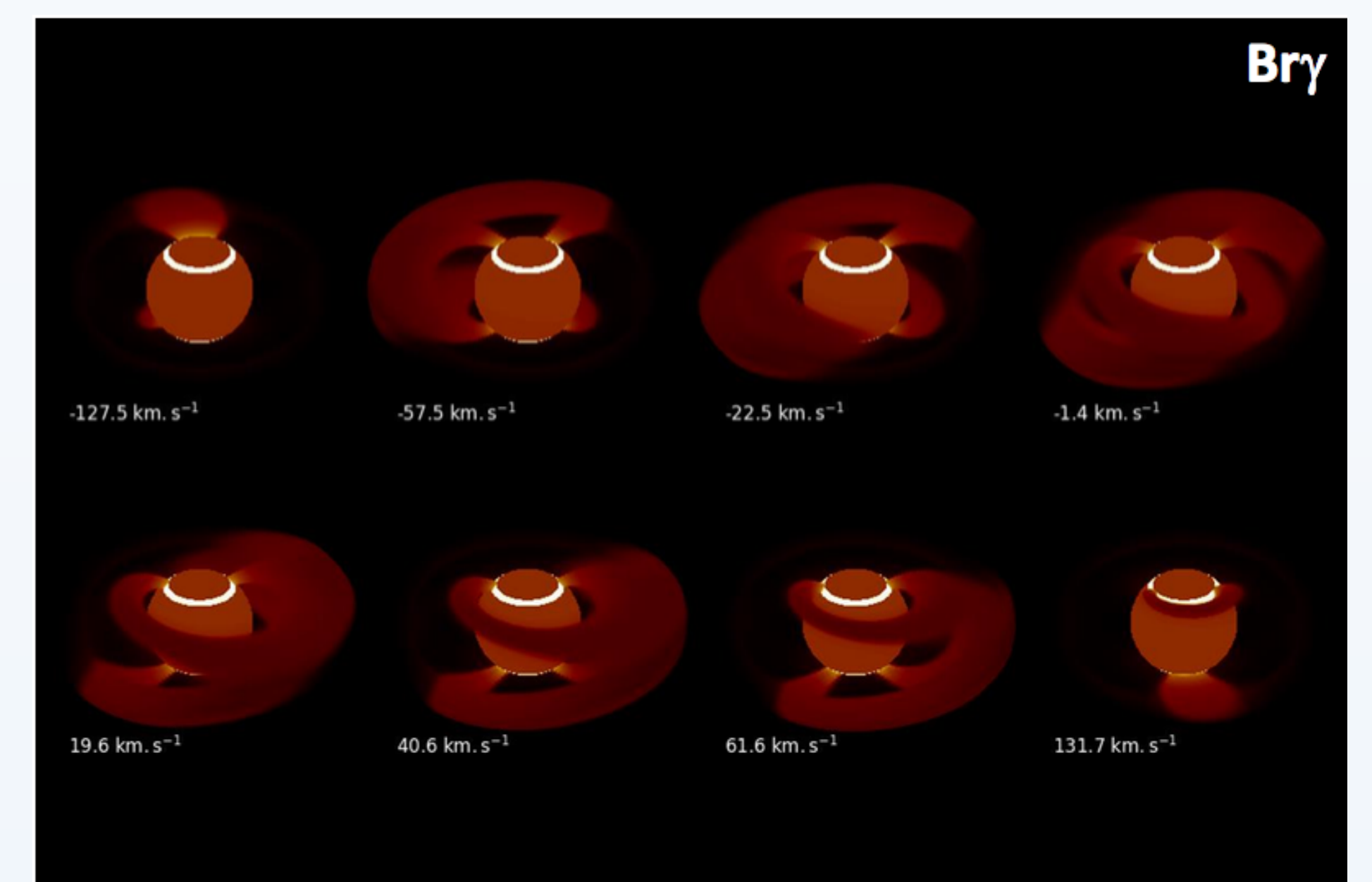
Funnel flows density map from the inner disk to the stellar surface



3D MHD simulations (PLUTO, G. Pantolmos)
Inclined dipole (20°); B = 1.2 kG

Magnetospheric accretion: radiative transfer models

Bry line emission from funnel flows (velocity channels across the line profile)

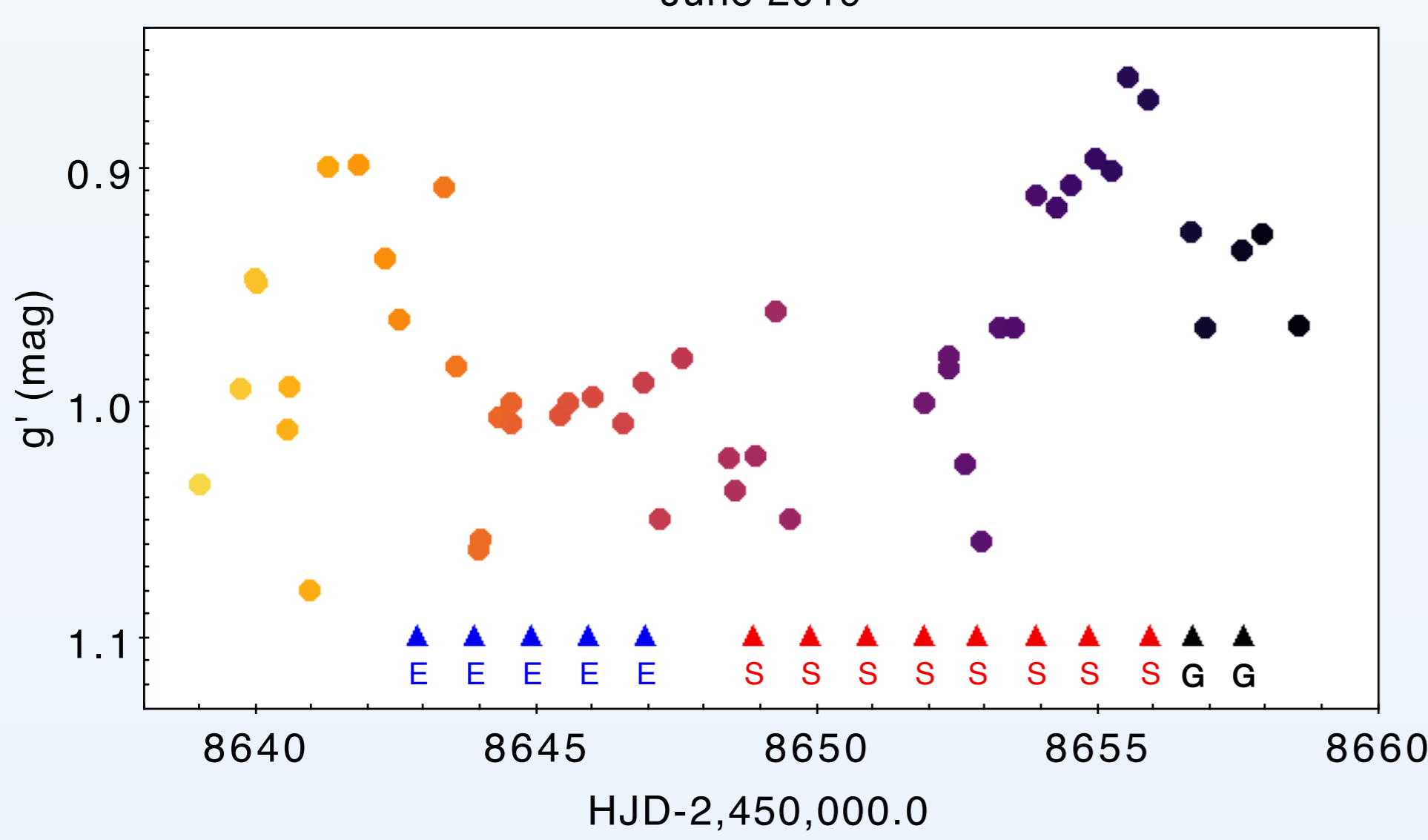


3D radiative transfer models (MCFOST-ART, Tessore+21)

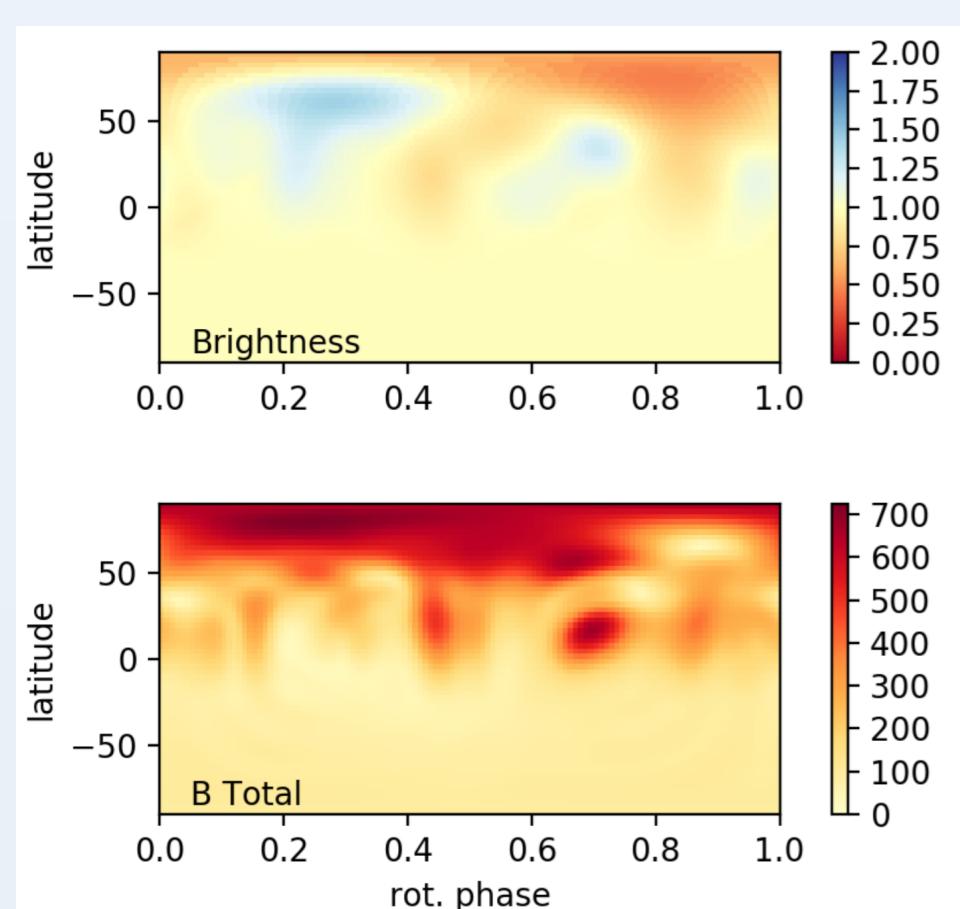
The observing campaign

- ESO VLT/Gravity 4-UT's
- CFHT/ESPaDOnS
- CFHT/SPIRou
- LCOGT photometry

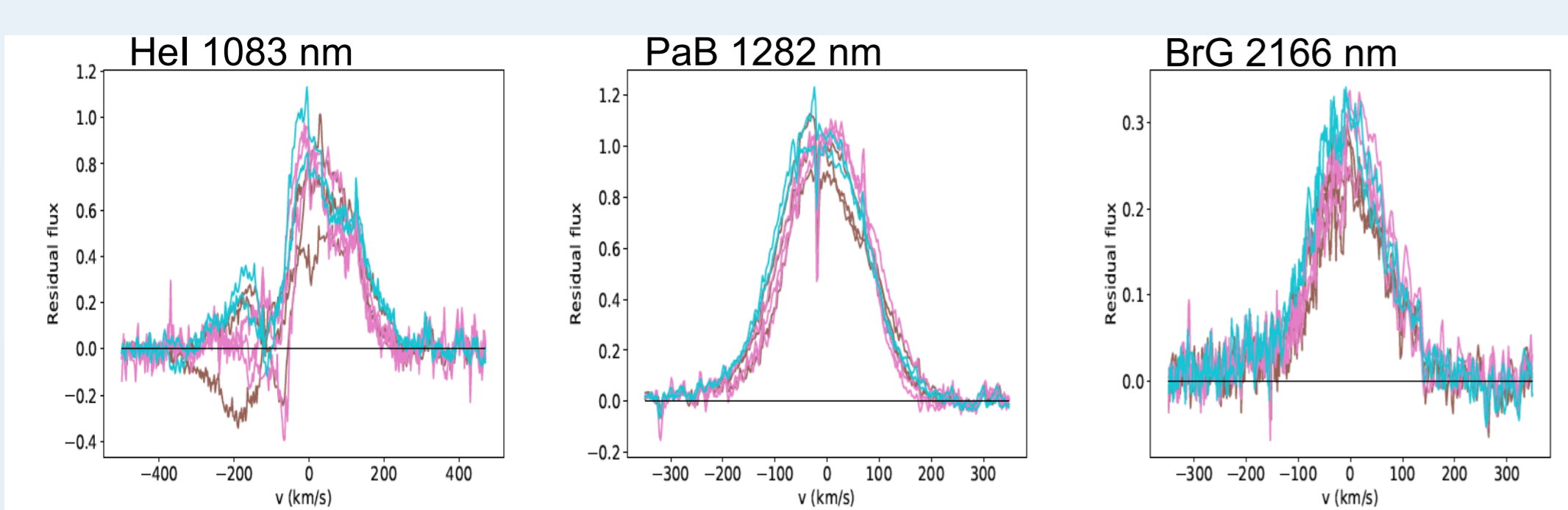
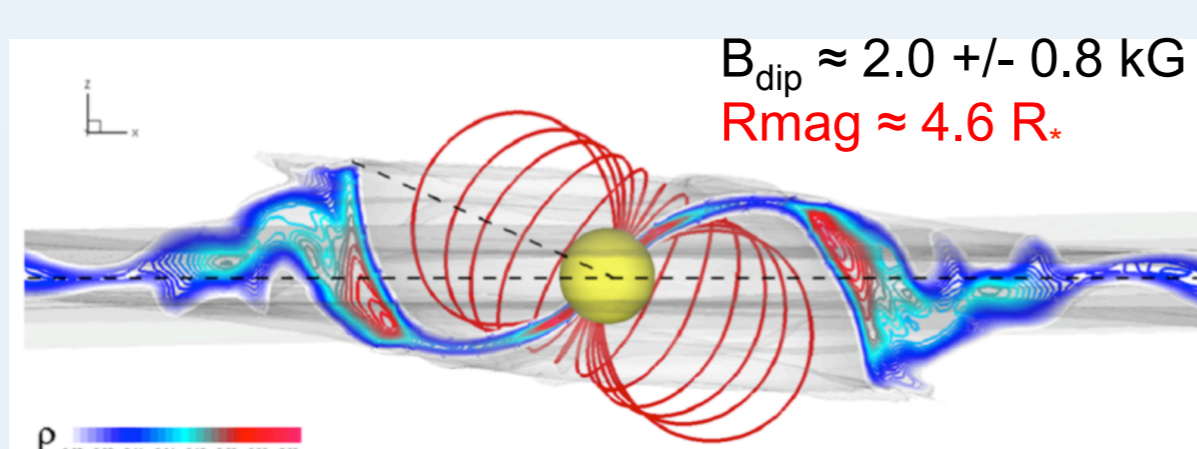
June 2019



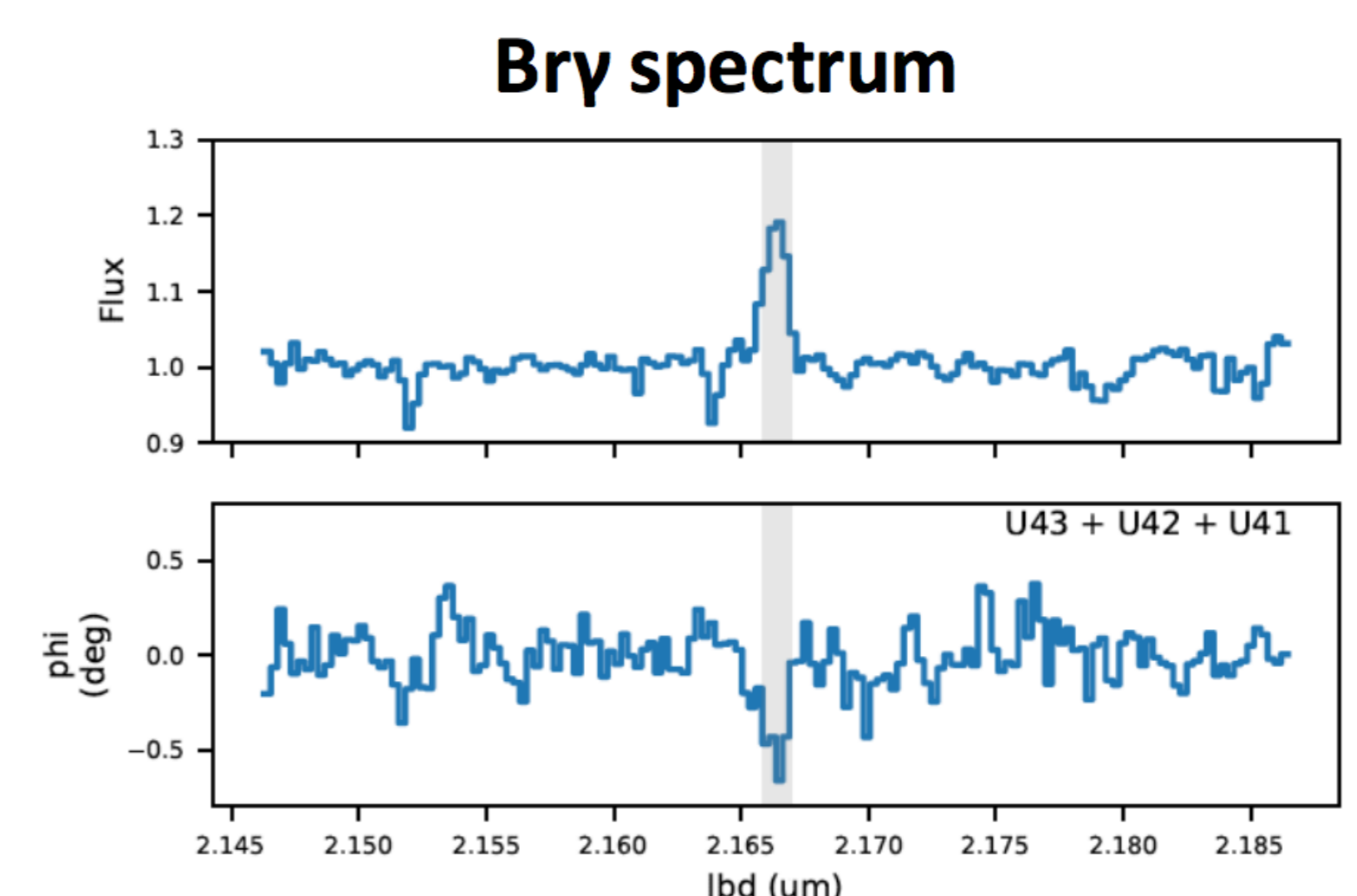
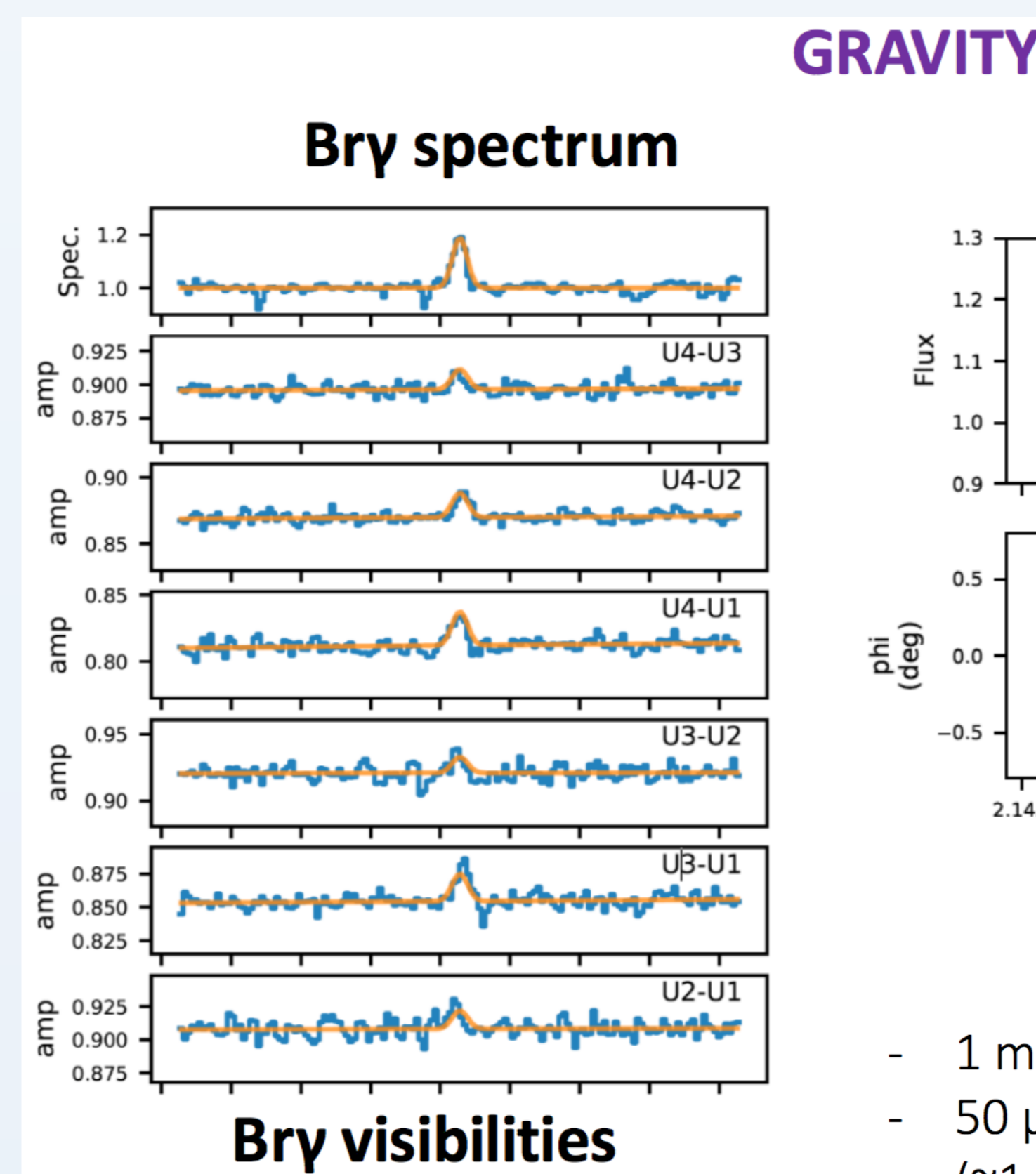
CFHT/ESPaDOnS, CFHT/SPIRou



Stokes I & V analysis
Line profile modulation
B field reconstruction



VLT/GRAVITY: Bry spectro-astrometry



Bry spectro-astrometry

- 1 mas resolution probes the inner disk (< 0.1 au)
- 50 μas astrometry probes the magnetosphere (~1 R*)
- Size of the magnetosphere < 5 R*
- Slightly offset from the star (~1 R*)
- Inner-outer disk misalignment confirmed

Conclusion

Interferometric and spectropolarimetric results consistently suggest a compact magnetospheric accretion region (<5R*) in agreement with MHD and RT models.

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