

# Probing Bow Shocks Around Exoplanets During Transits

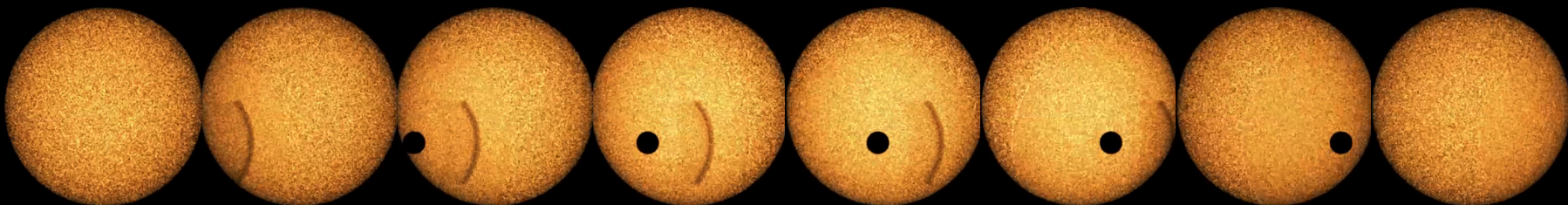
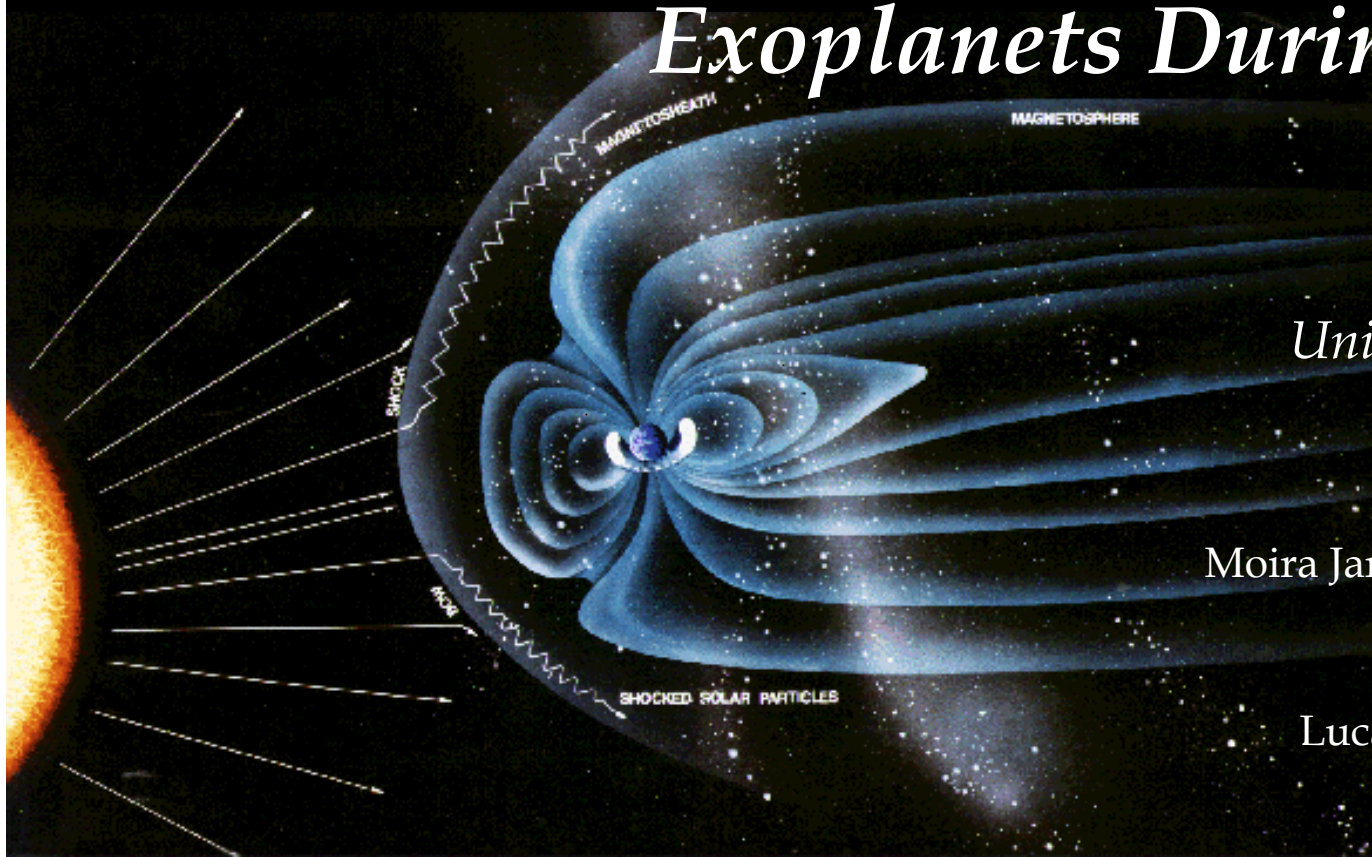
*Aline A. Vidotto*

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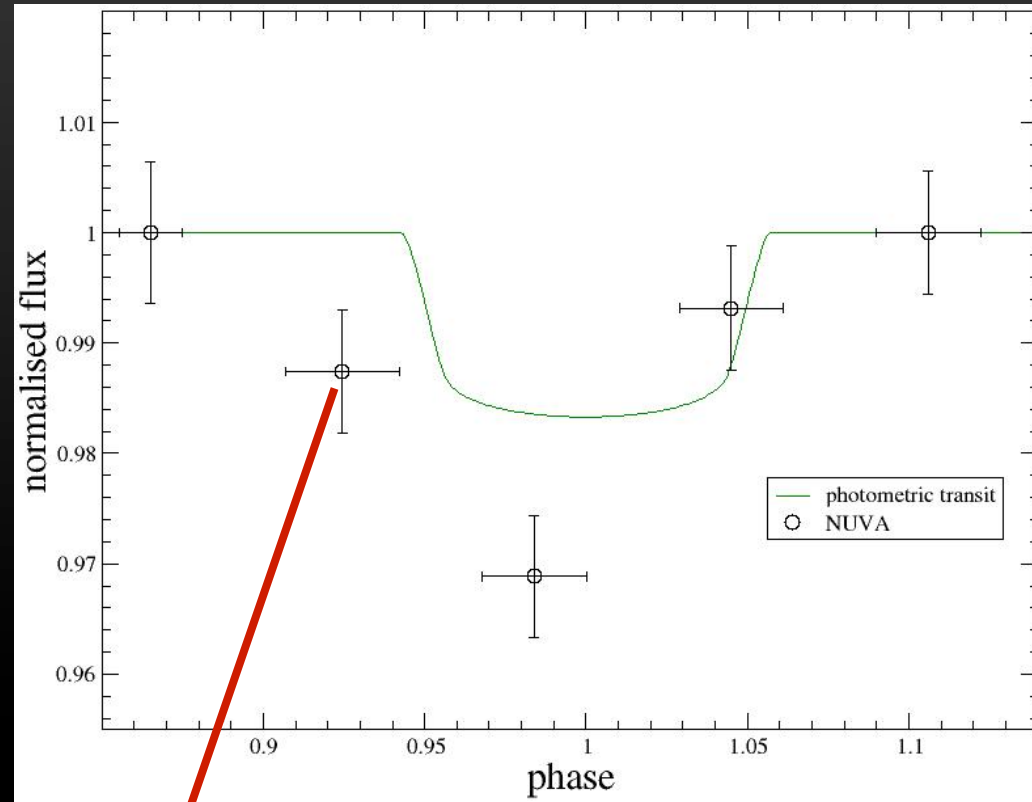
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(*Open University*)



# Near-UV Transit of WASP-12b: Early Ingress



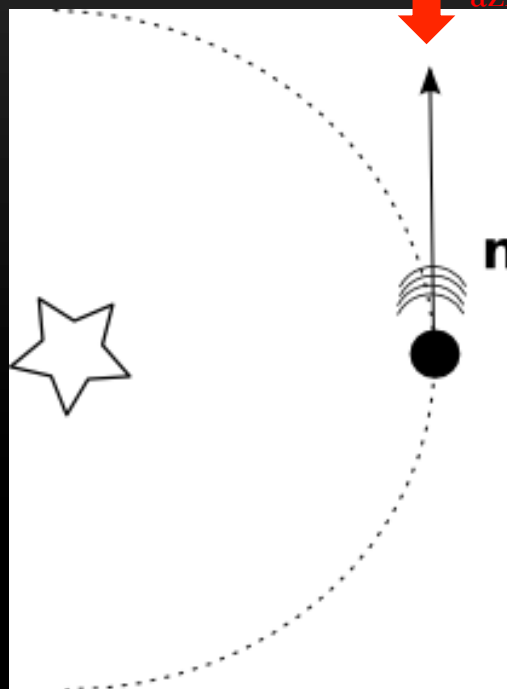
Adapted from Fossati et al. (2010a)

Early ingress in  
the near-UV

# Stellar Wind-Planet Interaction: ahead-shock

Face-on view

Vidotto, Jardine & Helling (2010)



Main flux of particles  
arriving at the planet:  
azimuthal direction

Close-in planets:  
high-speed orbits

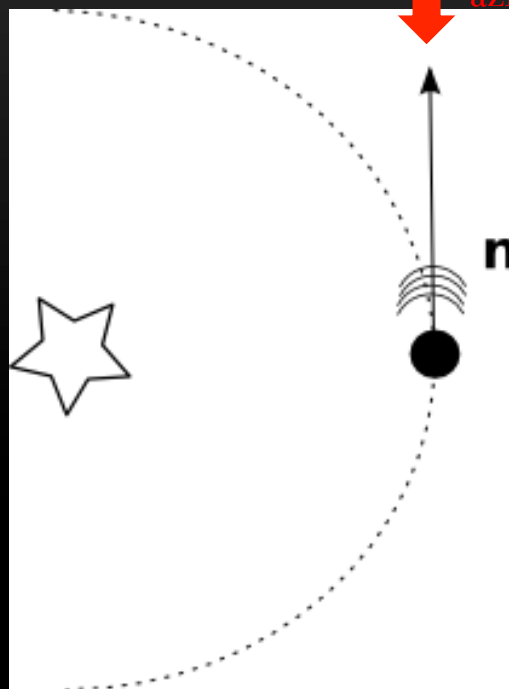


Supersonic orbital  
velocities → shock

# Stellar Wind-Planet Interaction: ahead-shock

Face-on view

Vidotto, Jardine & Helling (2010)



Main flux of particles arriving at the planet: azimuthal direction

Edge-on view



Llama et al (2011)

Close-in planets:  
high-speed orbits



Supersonic orbital  
velocities → shock

# Stellar Wind-Planet Interaction: ahead-shock

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Edge-on view



- ▶ For WASP-12 & WASP-12b:
  - ▶  $R_{\text{orb}} = 3.15 R_*$
  - ▶ Distance to the shock:  $r_M = 4.2 R_p$
  - ▶ Observational upper limit  $B_*$  (Fossati et al. 2010b):  $B_*^{\text{surf}} < 10 \text{ G}$ .

$$B_p^{\text{surf}} < 24 \text{ G}$$

(Vidotto, Jardine & Helling 2010)

## Summary and Future Prospects

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- ▶ Near-UV observations during transit: useful technique to probe the planetary magnetic field. (Vidotto et al. 2010)
- ▶ One case so far: WASP-12b
- ▶ Most promising candidates (Vidotto et al. 2011):  
WASP-19b, -04b, -18b, -05b  
CoRoT-7b, -1b  
HAT-P-7b  
TrES-3

*Need near-UV data  
for other transiting  
systems!*

