WFIRST can do it too:

On the discovery of transiting planets and binary stars with WFIRST

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NASA

WFIRST meeting, Pasadena, March 1, 2016

Eclipse/transit survey 101:

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• Many **epochs**:

System is out-of-eclipse most of the time



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 Many stars: Most binary systems will not show eclipses





Kepler-INT Survey - NGC 6791





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6 seasons x 72 days/season x 96 epochs/day - lunar passage = \sim 33,000





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WFIRST as an eclipse survey: Opportunity!!!



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Noise = 1 %

Opportunity!!!



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Warning: All numbers are rough estimates

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273 Known transiting planets with measured distance (NASA Exoplanet Archive)



Why do we need more (hot Jupiter) planets ? Fainter host stars ⇒ more distant host stars Planets orbiting a different stellar population



Planets orbiting a different stellar population

- Beyond the solar neighborhood
 - Galactic disk

- Beyond the solar neighborhood
 - Galactic disk
 - Galactic bulge

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• M-dwarfs


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 $\mathsf{Depth} = \left(\frac{R_{\mathrm{Jupiter}}}{R_{\mathrm{G2}}}\right)^2 = 1 \%$

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Science cases:

Hot Jupiters (NASA Exoplanet Archive)





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- White dwarfs:
 - Planetary systems future fate.













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 - Pixel centroid analysis.







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Planets orbiting a different stellar population The challenges (partial list):

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Eclipsing binary stars as false positives:
Color dependent depth variation (W, Z).





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 - Secondary eclipse deeper in NIR.





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- Blending:
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- Eclipsing binary stars as false positives:
 - Color dependent depth variation (W, Z).
 - Secondary eclipse deeper in NIR.

• Photometric stability between exposures.





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