Hot Jupiter Detection Experiment (HJUDE) Jake Hartman (JPL) Pls: G. Hallinan, G. Taylor, S. Ellingson Caltech SURF: Lin Cheng Targeted sources Suitability of the LWA1 Observations to date To-do list Targeted sources Suitability of the LWA1 Observations to date To-do list









List of targets

	d	a	$P_{\rm orb}$	M	Coordinates	Best	Num.
Planet	(pc)	(AU)	(d)	$(M_{\rm J})$	(J2000)	month	days
Hot Jupiters likely to be tidally locked:							
v And b	13.49	0.059	4.62	1.4	$01^{\rm h}37^{\rm m}$ +41°24′	Sep	37
τ Boo b	15.62	0.048	3.31	6.5	$13^{h}47^{m} + 17^{\circ}27'$	Mar	43
HD 189733 b	19.45	0.031	2.22	1.13	$20^{\rm h}01^{\rm m} + 22^{\circ}43'$	Jun	29
HD 187123 b	48.26	0.042	3.10	> 0.51	$19^{h}47^{m} + 34^{\circ}25'$	Jun	31
HD 209458 b	49.63	0.047	3.52	0.69	$22^{h}03^{m} + 18^{\circ}53'$	Aug	32
Hot Jupiters less likely to be tidally locked:							
$55 \mathrm{Cnc} \mathrm{b}$	12.34	0.116	14.65	> 0.84	$08^{h}53^{m} + 28^{\circ}20'$	Dec	30
$\rho \ {\rm CrB} \ {\rm b}$	17.24	0.226	39.84	> 1.06	$16^{h}01^{m} + 33^{\circ}18'$	Apr	30
70 Vir b	17.99	0.484^{*}	116.69	> 7.46	$13^{h}28^{m} + 13^{\circ}47'$	Mar	30
HD 195019 b $$	38.52	0.137	18.20	> 3.58	$20^{h}28^{m} + 18^{\circ}46'$	Jun	30
HD 114762 b	38.65	0.363^{*}	83.89	>11.68	$13^{h}12^{m} + 17^{\circ}31'$	Mar	30
HD 38529 b $$	39.28	0.131^{*}	14.31	> 0.86	$05^{h}47^{m} + 01^{\circ}10'$	Nov	30
HD 178911 Bb	42.59	0.345^{*}	71.48	> 7.29	$19^{h}09^{m} + 34^{\circ}36'$	Jun	30
HD 37605 b $$	43.98	0.261^{*}	54.23	> 2.86	$05^{h}40^{m} + 06^{\circ}04'$	Nov	30

* Sources with eccentricities greater than 0.1.



 Targeted sources
 Suitability of the LWA1 Observations to date To-do list

- Low frequency: $eB/2\pi m_e = 28$ MHz at 10 G
- Bright!
 ~100 mJy fluxes predicted (but less than confusion)
- High circular polarization: LWA1 is very good at this!
- Predictably time-variable:
 - pulsar-like emission
 - secondary eclipses
 - periastron passages of high-eccentricity HJs
- However, substantial observing time is required for good upper limits





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Phase coverage of known-period HJs





Targeted sources
Suitability of the LWA1
Observations to date
To-do list

Observations processed to date

429 beam hours taken

Tau Boötes b

- HJ: 90 beam hours
- Ref: 90 beam hours

HD 189733 b

- HJ: 21 beam hours
- Ref: 21 beam hours



Early Tau Boo observation



Long Wavelength

Early Tau Boo observation



Long Wavelength

Early Tau Boo observation



Later Tau Boo observation



Long Wavelength Array

Later Tau Boo observation



Long Wavelength Array

Later Tau Boo observation



Deep integration

Work in progress!

Integration of Tau Boo b field, 58 – 74 MHz, from March 8.

- Total intensity
- Circular polarization
- —— 1/T





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- Total intensity
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Credit: Lin Cheng (Caltech)



Targeted sources
Suitability of the LWA1
Observations to date
To-do list

- Circular pol calibration
 - sign: RH or LH?
 - correction for ant pattern
- Live testing of beam levels
 - what is the best level?
 - automatic gain control
- Optimal zeroing of DRX data around clipped samples
- RFI flagging and excision
- Bandpass calibration
 - bootstrapped
 - modeled
- Flux calibration



Polarization leakage for Cyg A in TBN data, as measured by PASI



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http://www.phys.unm.edu/~lwa/lwatv/beam_status.html



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Too high (Tau Boo; March 13; 8 – 44 MHz)



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