

Diameters and Fundamental Properties of K+M Dwarfs

and some other stuff.

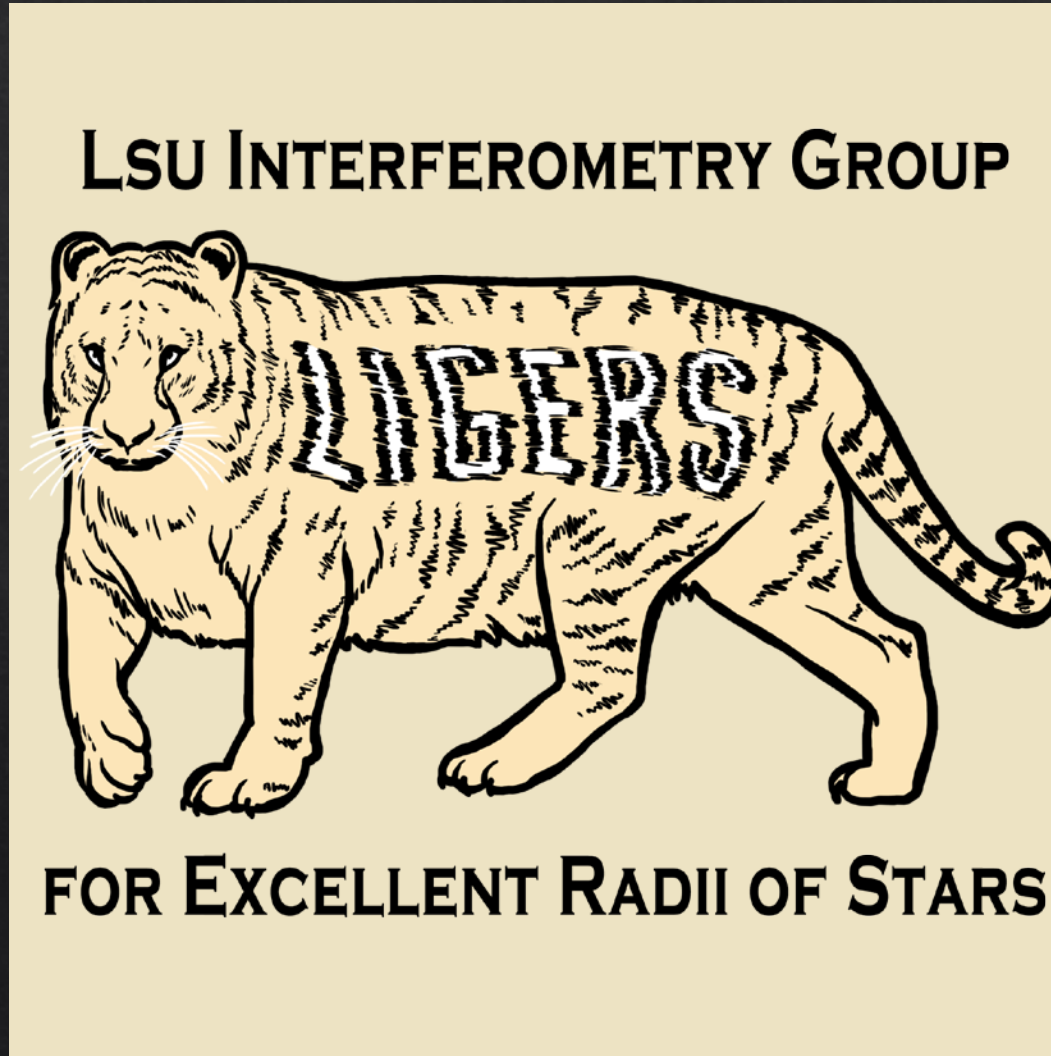
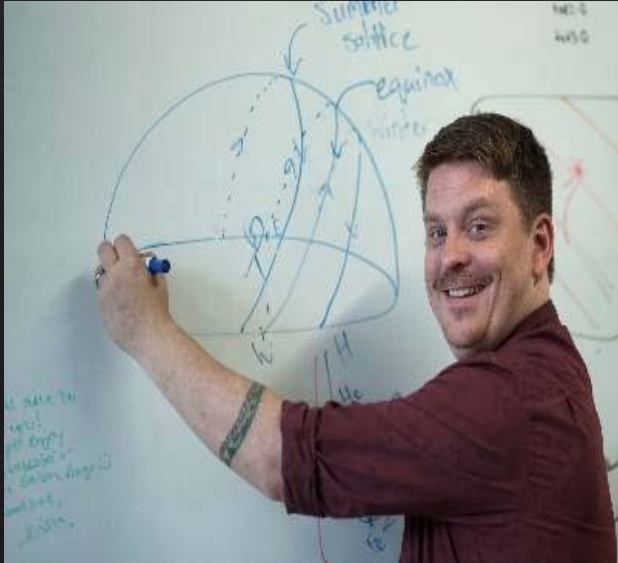
Tyler Ellis – Louisiana State University

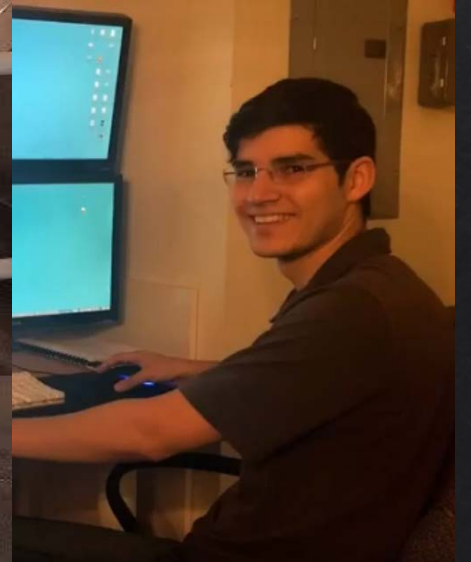
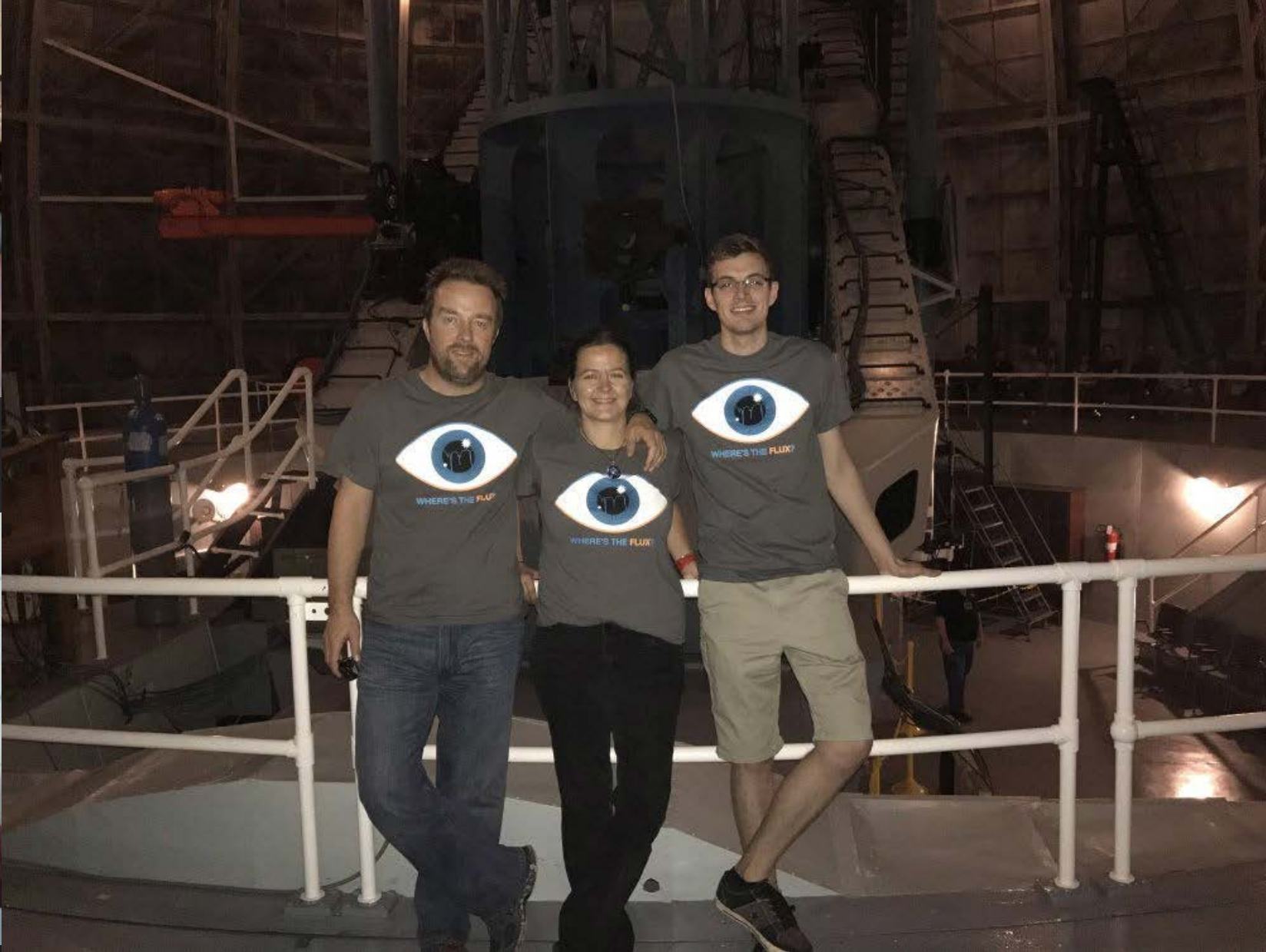
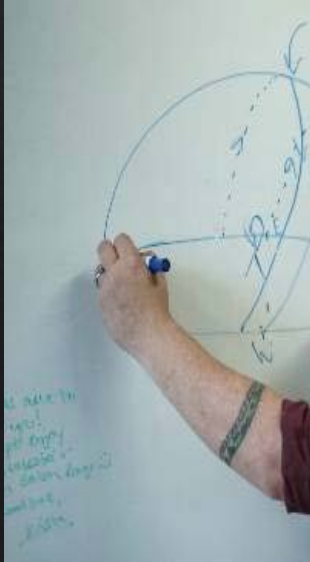


Your Talk Title Here

Tyler Ellis – Louisiana State University







Ian Sager – Data/Obs Wrangler




AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV
			Target	HD	B	V	K	RA	DE	Sptype	Mas	Theta est	d [pc]	M_k	(V)
GCPD colors converted to CIT for use ifrom Henry and McCarthy eq2a&b															
55.38	+05 10 08	9	GJ 752A	180617A	10.576	9.11	4.64	19 16 55.3	+05 10 08	M3.0	V	0.5	0.778	5.87	5.8
21.6	+69 39 40	4	GJ 764	185144	5.49	4.68	2.78	19 32 21.6	+69 39 40	K0	V	###	1.28	5.75	3.98
5 53.9	+38 44 58	8	GJ 820A	201091A	6.39	5.21	2.39	21 06 53.9	+38 44 58	K5.0	V	###	1.91	3.50	4.67
5 55.3	+38 44 31	8	GJ 820B	201091B	7.4	6.03	2.73	21 06 55.3	+38 44 31	K7.0	V	###	1.75	3.50	5.01
7 59.5	+57 41 45	8	GJ 860A	239960A	*	9.79	4.78	22 27 59.5	+57 41 45	M3.0	V	###	0.98	4.03	6.75
49.7	+44 20 02	1	GJ 873	RA # 320	11.597	10.22	5.29	22 46 49.7	+44 20 02	M3.5	V	###	0.64	5.12	6.74
34.8	+16 33 12	8	GJ 880	216899	10.097	8.66	4.58	22 56 34.8	+16 33 12	M1.5	V	###	0.81	6.85	5.40
17.0	+57 10 06	5	GJ 892	219134	6.57	5.56	3.27	23 13 17.0	+57 10 06	K3	V	###	1.21	6.55	4.19
52.2	+19 56 14	1	GJ 896A	how abot	11.809	10.26	5.33	23 31 52.2	+19 56 14	M3.5	V	0.4	0.636	297038	6.182
36	5.20	VLT	GJ 908	AO 12839	10.446	8.99	5.05	23 49 12.5	+02 24 04	M1.0	V	###	0.89	5.98	6.17
			GJ 631	149661	6.55	5.76	3.83	16 36 21.4	-02 19 28.501	K0	V	###	0.77	9.75	3.88
			GJ 105	16160	6.79	5.82	3.45	02 36 04.85	+06 53 12.733	K3	V	###	1.11	7.18	4.17
			GJ 33	4628	6.64	5.75	3.61	00 48 22.9	+05 16 50.214	K2	V	###	0.84	7.45	4.25
			GJ 514	CHARA #	10.542	9.04	5.03	13 29 59.7	+10 22 37.784	M0.5	V	0.5	0	7.656	5.61
			GJ 809	199305	9.98	8.54	4.62	20 53 19.75	+62 09 15.805	M0.5	V	###	0.75	7.05	5.38

L0: Archive 😞

Containing the word:	
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<input type="checkbox"/> Targets	★ Browse Structure Search Insert Empty Drop
2 tables	Sum

Rows	Type	Collation
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384	MyISAM	latin1_sw
543	InnoDB	utf8mb4

L1: SQL Database 😊

 TOM Toolkit

Home

Targets

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Update Observations

View	Target	Facility	Status	Saved Data	Download All
<div>Details</div>	30 Doradus	LCO		3	
<div>Details</div>	ZTF18aberps	LCO	WINDOW_EXPIRED	0	
<div>Details</div>	Messier 42	LCO	COMPLETED	1	<div>Save</div>

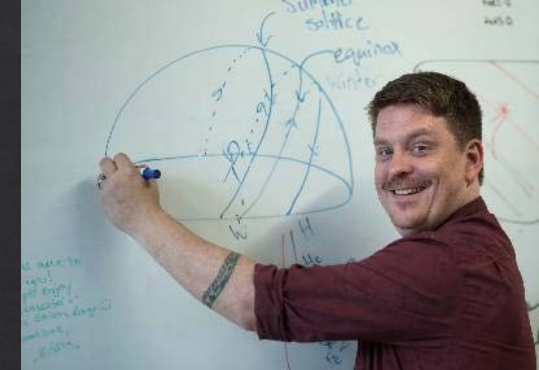
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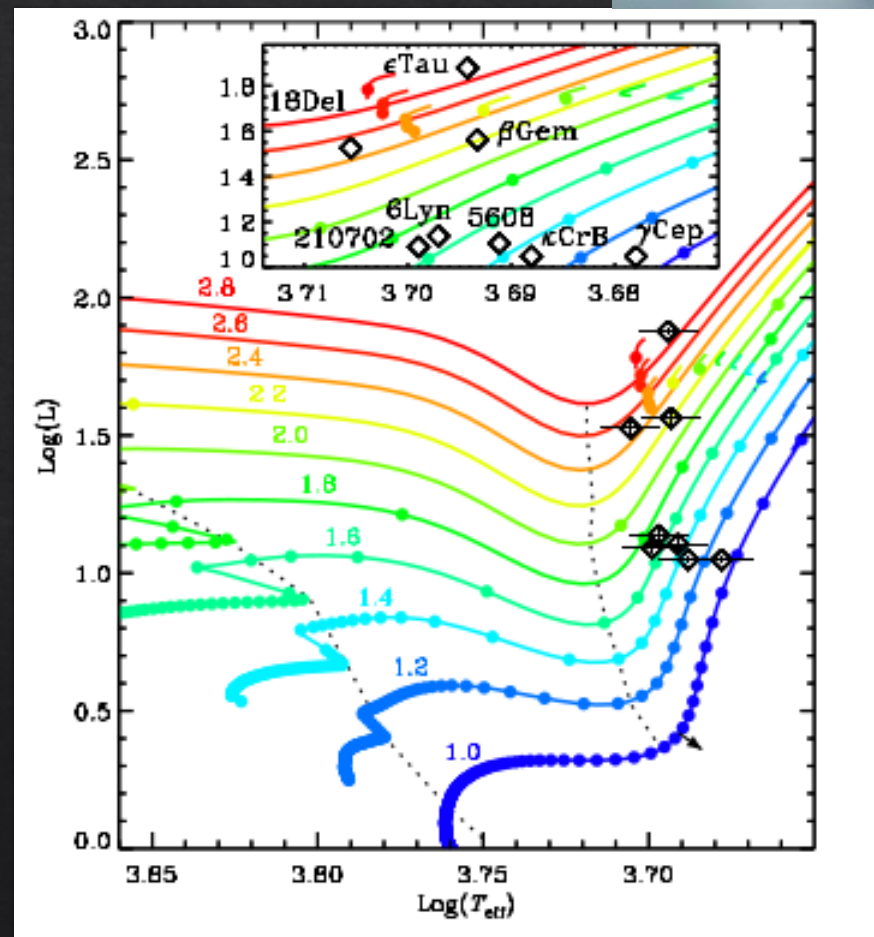
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L2: TOM Toolkit 🥰

Weighing in on Retired-A Star Mass



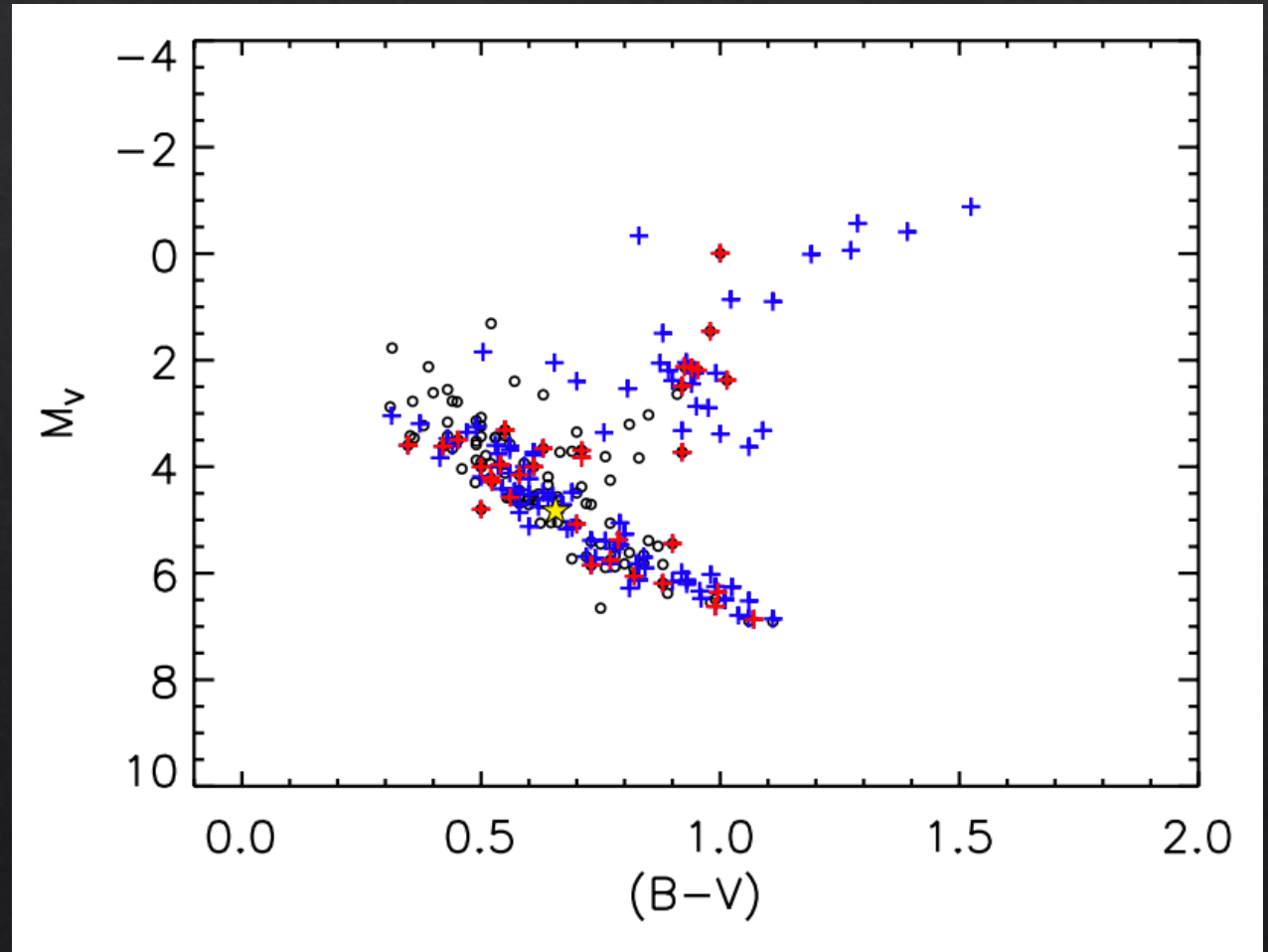
- ◆ Goal: Derive masses for evolved analogs of A stars to determine A star exoplanet occurrence rates
- ◆ Problem: Previous spectroscopically derived masses (Johnson et al. 2006) may be overestimated by 10 to 20%
- ◆ Project Goal:
 - ◆ Using CLASSIC data to precisely measure retired-A star position on H-R diagram → mass from isochrones
 - ◆ Begin work on T_{eff} -color empirical relations for giant stars



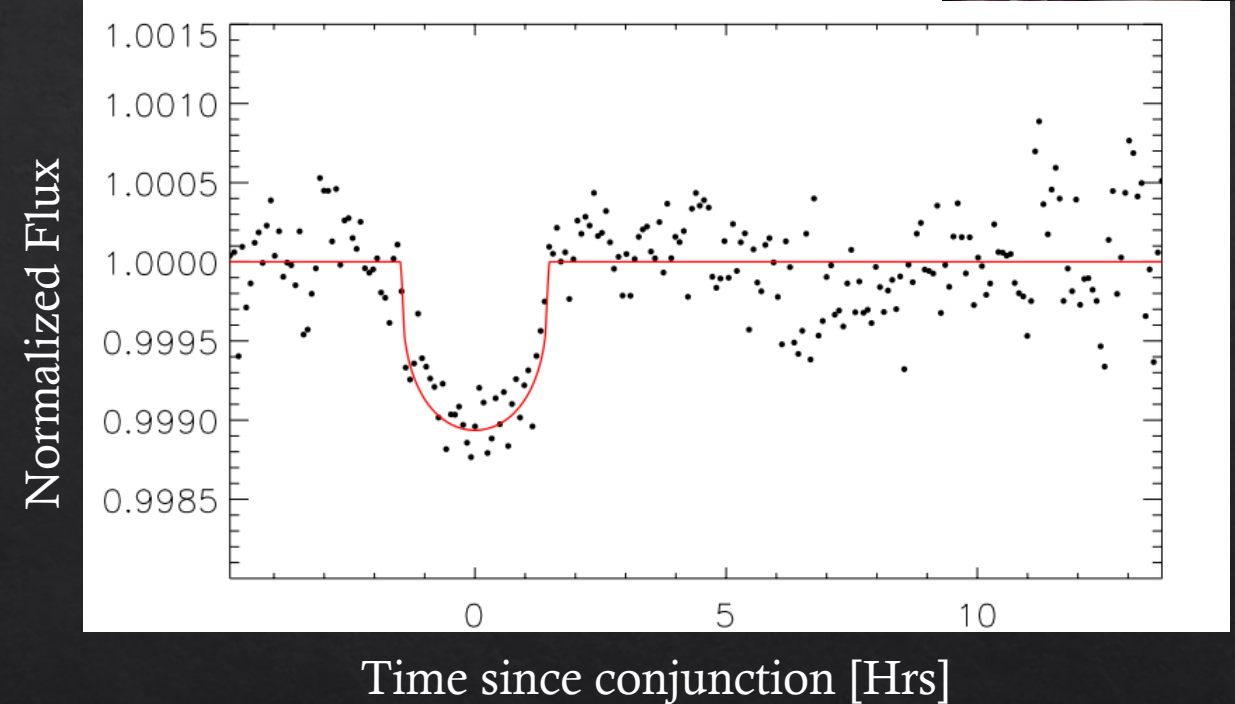
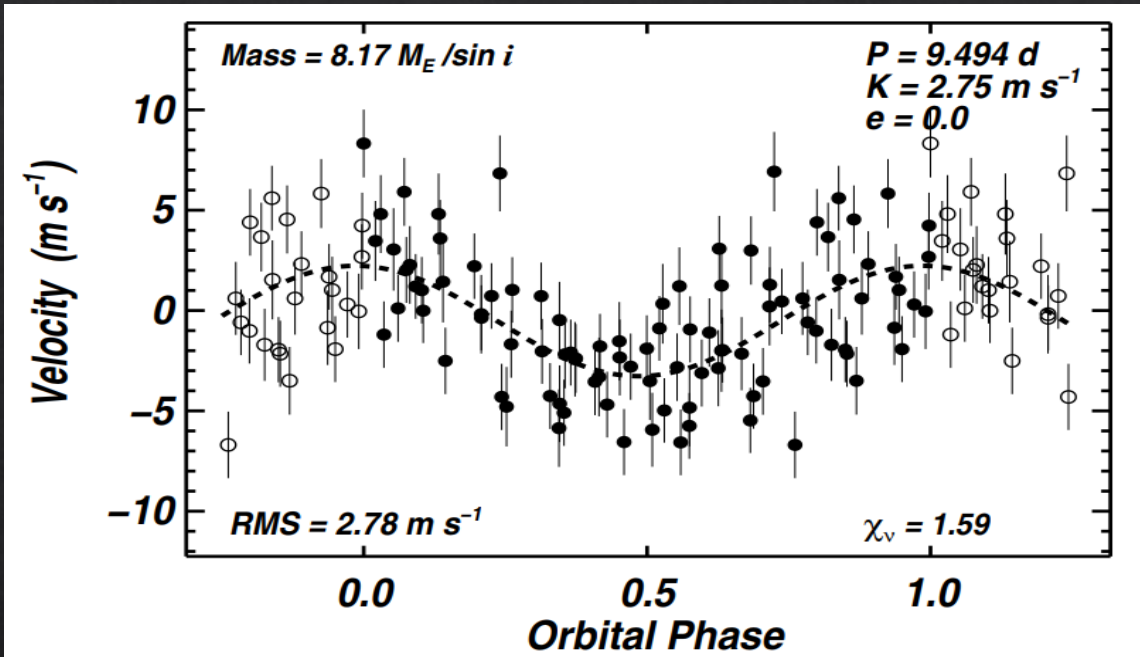
Stello et al. (2017)

F+G Diameters and Surface Brightness

- ◇ Expanding under-sampled region of HR diagram:
 - ◇ Metal-poor stars
 - ◇ G types
 - ◇ Subgiants
- ◇ Develop surface brightness and collect radii for:
 - ◇ Exoplanet characterization
 - ◇ Calibrate effective temperature scale
 - ◇ Refine evolutionary models



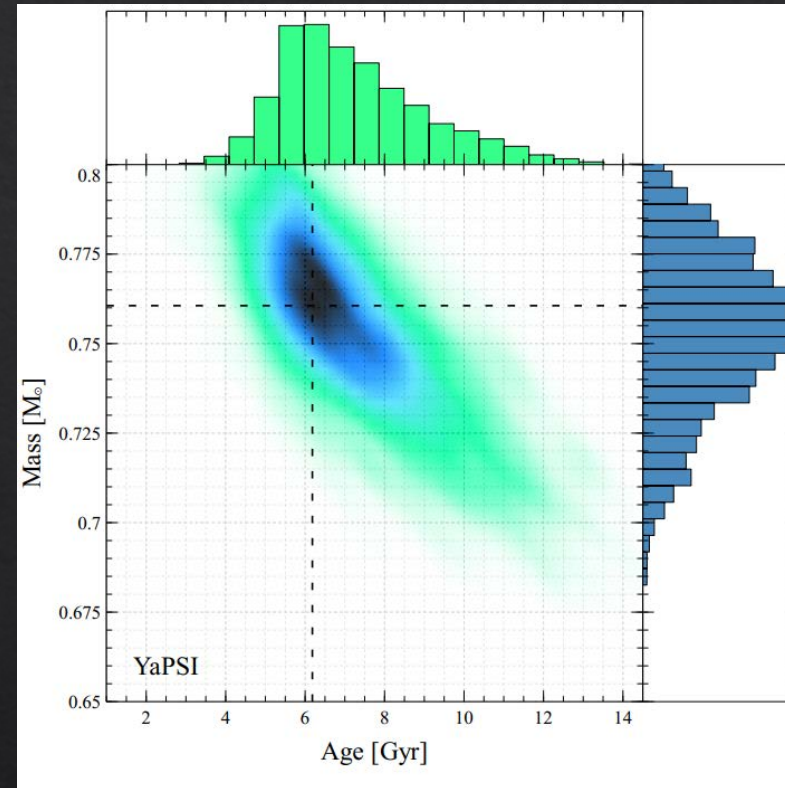
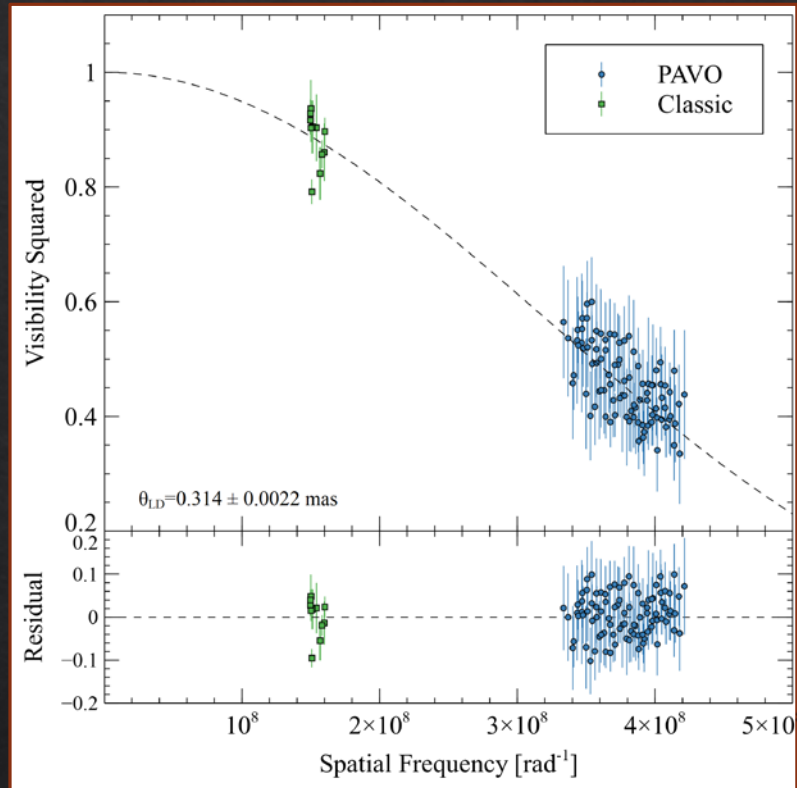
HD 97658 – A Super-earth Host



◇ HD 97658 was originally found by Eta-Earth project (Howard et al 2010) Keck HIRES RV

- Dragomir et al (2013) follow-up confirmed and revealed a super-earth planet

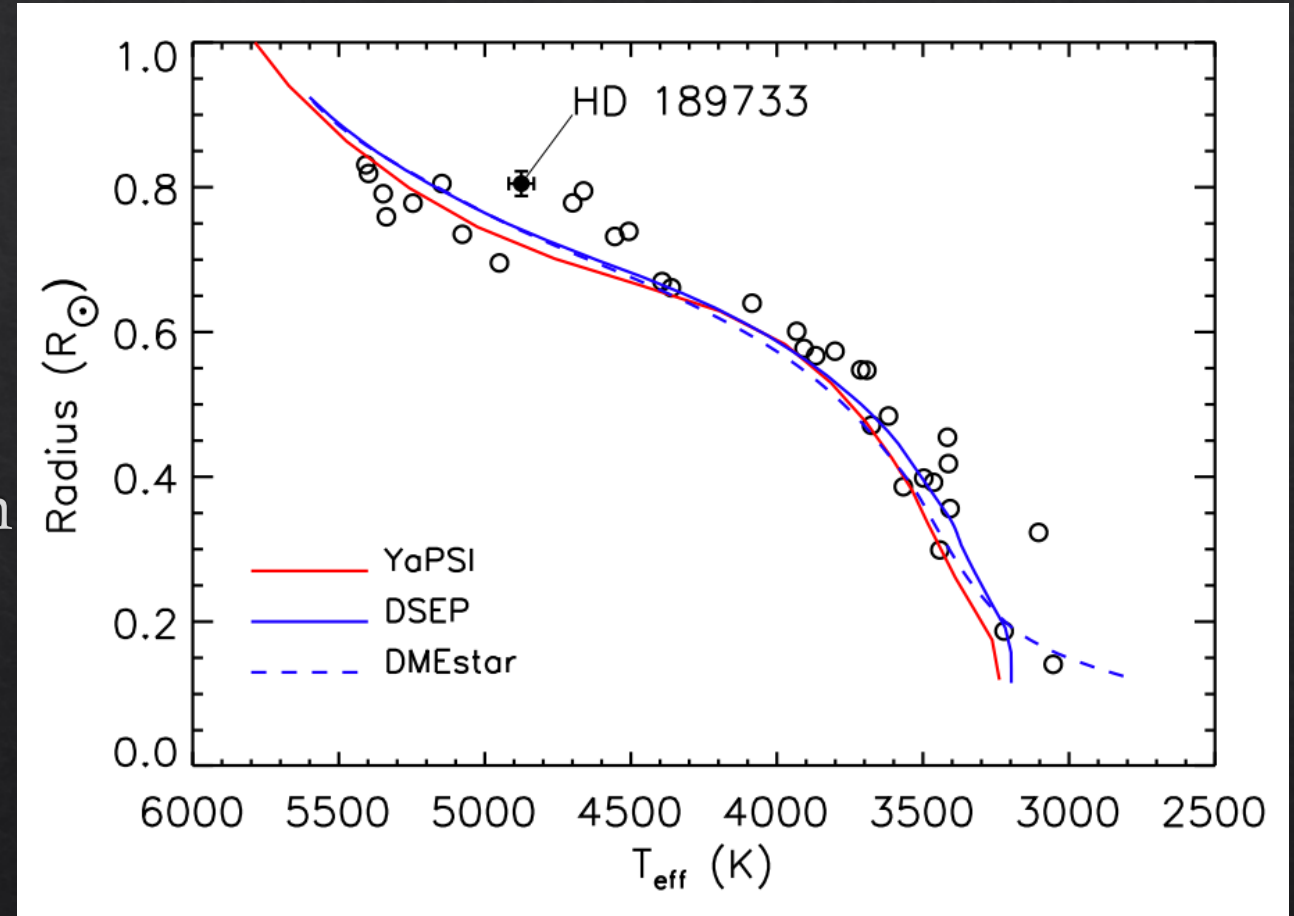
HD 97658 – Observations with CHARA



- Observations with CHARA's Classic and Pavo in 2015 yield an angular diameter of 0.314 mas – further refining planet properties
- Bayesian determination of stellar age and mass with the YaPSI evolutionary tracks indicate $M = 0.75 \pm 0.02 M_{\odot}$ with an age of $6.2 \pm 1.2 \text{ Gyr}$

Convection and Model Discrepancies

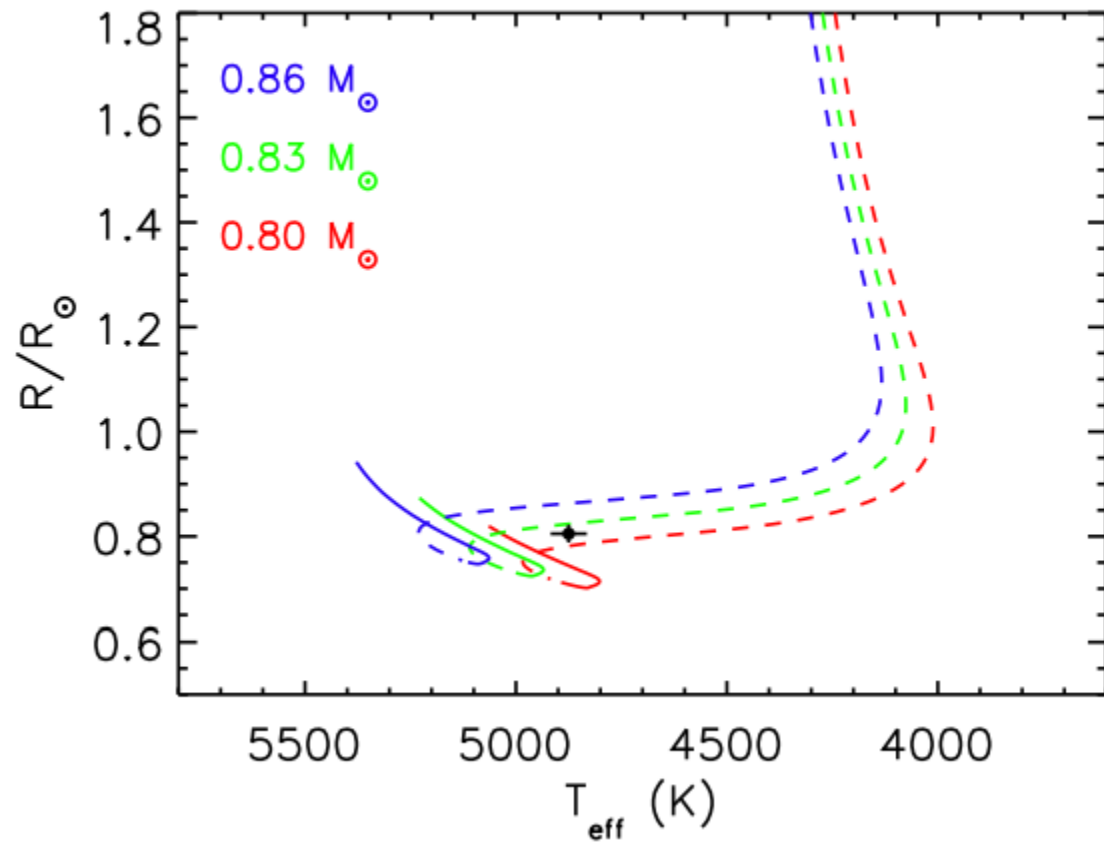
- ◇ Incongruent model estimated parameters
- ◇ Boyajian et al 2015 showed 5% underestimation for cool stars
- ◇ α -MLT parameter and convection the suspected issue



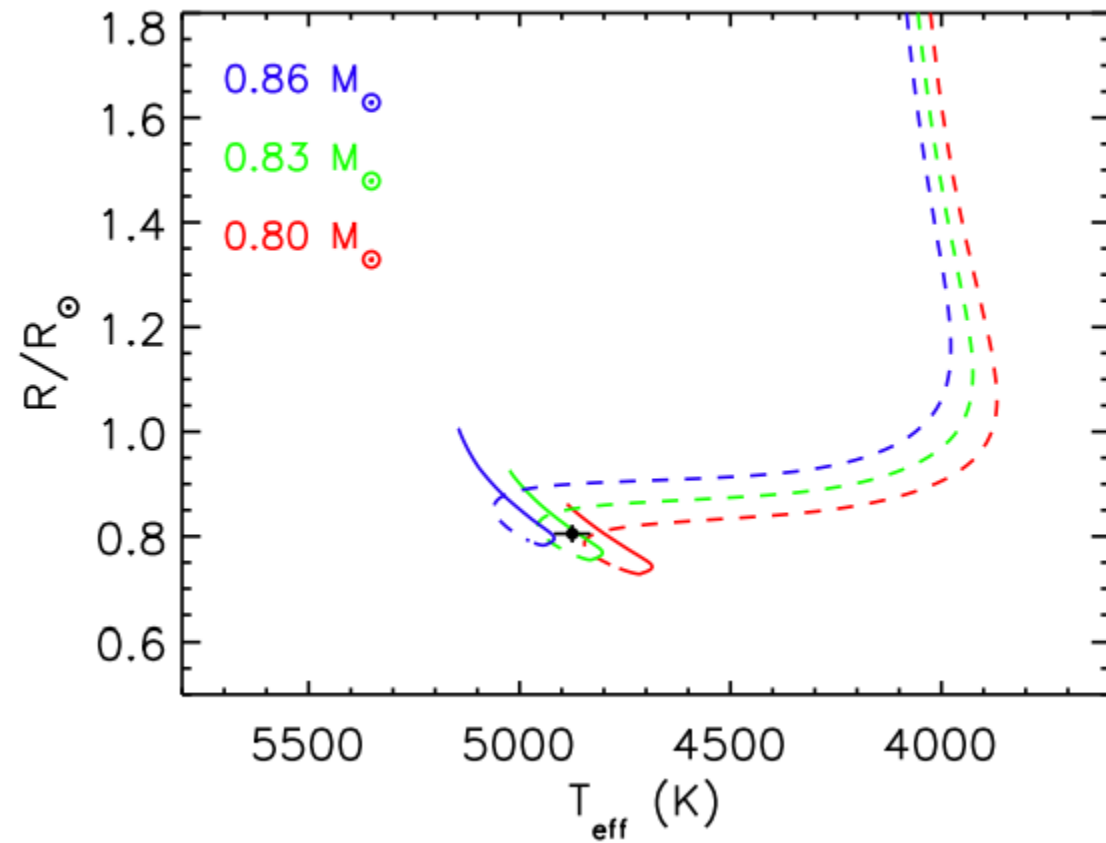
HD 189733 failing to fit in, Boyajian et al 2014

Mixing Length Mixup

$\alpha_{\text{MLT}} = 1.83$ (solar)



$\alpha_{\text{MLT}} = 1.34$



Summary

- ◆ We're exploring stellar diameters to:
 - ◆ Improve exoplanet characterization
 - ◆ Refine surface brightness relations
 - ◆ Develop T_{eff} -Color relations
 - ◆ Probe under-sampled regions of HR diagram
- ◆ K+M Survey
 - ◆ We have 12 nights spread over next 3 semesters, typically complete obs. for at least 1 star per combiner per night – averaged out
 - ◆ Shooting to expand measured K/M diams by $\sim 50\%$ (let's call it an even 20), weather and techno deities permitting (I do want to graduate...)