



# Know Thy Star... Know Thy Closing Remarks

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**Know Thy Star - Know Thy Planet:**

**Assessing the Impact of Stellar Characterization on Our Understanding of  
Exoplanets**

**October 9-12, 2017 —Pasadena, CA**

**#KnowThyStar**

# Know Thy Star...

Life used to be simple – One solar system with 9 planets,  
Stars 100% understood, dark matter meant late M stars and BDs

- **Meeting Diversity**  
People - age challenged to high school  
from all over the world  
Span of science expertise and variety of backgrounds
- **Great talks, best in many years**
- **Open access and collaborations – models, codes, data -> better science and more fun**
- **Happy to see (bright) stars back in vogue & Binaries**
- **What do we need? (just) spectra, photometry, images**

# Know Thy Star...

## Some General Observations:

- Kepler statistics (e.g.,  $P < 100$  days), much work will be done on K2, TESS planets
- Binary Stars – Generally thrown out! But need to detect to correct radii distribution, Occ. Rates, understand other consequences...
- Connect direct imaging planets vs. RV planets vs. transiting planets vs. microlens planets, ...
- Larger samples, non-human analysis, statistics
- Planets – mean density to interior structures  
Detailed elemental abundances
- Young Stars (clusters), inflated planets

# Know Thy Star...

## Some General Observations II:

- “Non-host” star control samples
- Hot Jupiters, Brown Dwarfs, Giant planets, formation
- M Stars – Teff, M, R, [M/H], ...
- Stellar “noise” and RV detections/masses of small planets
- Need fundamental stellar properties
- Many new clever techniques
- New “workhorse” instruments for large sample collection
- We have a lot to do
- Most of you are the future – don’t blow it

# Know Thy Star...

## Planet Formation:

Location and core growth

- Binararity

Metal Content

Atmospheric formation / evolution (flares?)

Planet Migration

>1 formation pathway

## High-Resolution imaging

We see  $\frac{1}{2}$  of companions  $<0.25''$ ,  $\frac{1}{4}$  within  $0.16''$

Need for multiple attacks to yield companion parameters, background scene

Which star does planet orbit? Mostly the “primary”?

How does HZ get effected?

Binary star demographics  $\leftrightarrow$  field binaries ?

Contamination of RV signals, atm transmission spectra?, ...

Planet formation mechanisms



# Know Thy Star...

## Astroseismology

Learned on Kepler

- Some bright Stars and Giants in K2

Will be overwhelmed on TESS, but will have additional parameter checks with interferometry

## GAIA

Some help in Exoplanets

Great help in host star parameters

## TESS

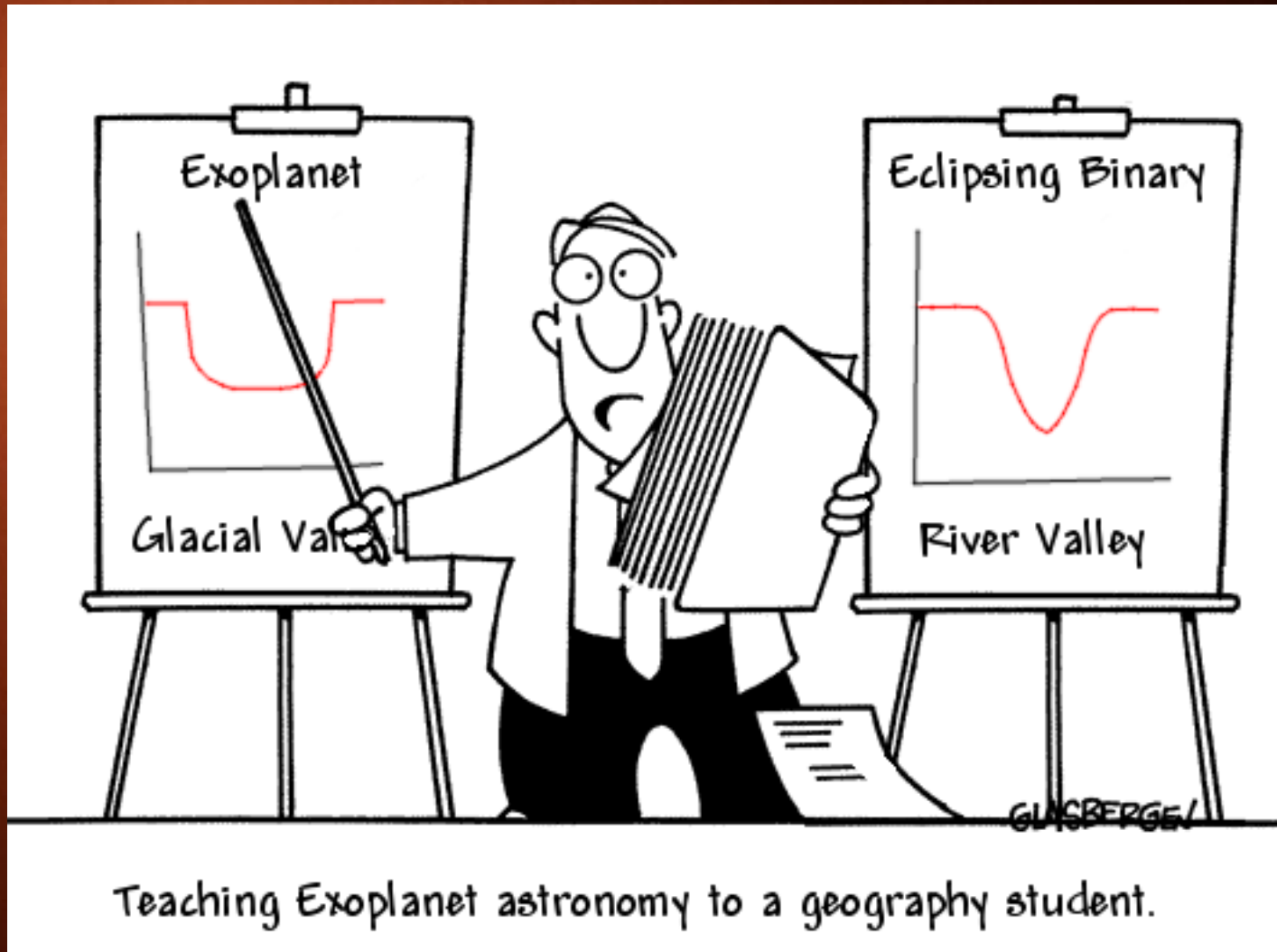
Are we ready? (Lots here)

Need to prioritize targets for follow-up

Microlensing and Interferometry will play larger role

Write JWST proposals

# Know Thy Star...



Teaching Exoplanet astronomy to a geography student.

# Know Thy Star...

“Red noise is a problem”

“PYTORCH – The only thing Facebook ever did that was useful to humanity”

“OK, I’ll throw up...”

“You can’t have a Habitable Zone without having a star”

“That is a known problem but it’s definitely not your fault”

“If you do not consider stellar multiplicity, You get everything wrong”

“The sun is not solar-like” -- “Earth-like is not Earth-like”

“The answer is maybe or maybe not!”

“We are fighting observational bias and incompleteness”

“Binary stars are fabulous. Binary stars are a real problem”

“Lambda Boo – Looks like a Disk, Quacks like a disk”

“Stromgren photometry”

“Never underestimate the ability of Nature to screw with you”

“Know Thy Binary Stars, Know Thy Planet”

“Where’s my coffee?”

“The more unbiased you are, the more wasteful you are.”

“Stellar parameters is a naughty problem”

“Know Thy Jitter, Find Thy Planets”

“I get really excited when I see this plot”



# Know Thy Star...



Stay tuned for....

Revenge of Know Thy Star, Avenge Thy Planet