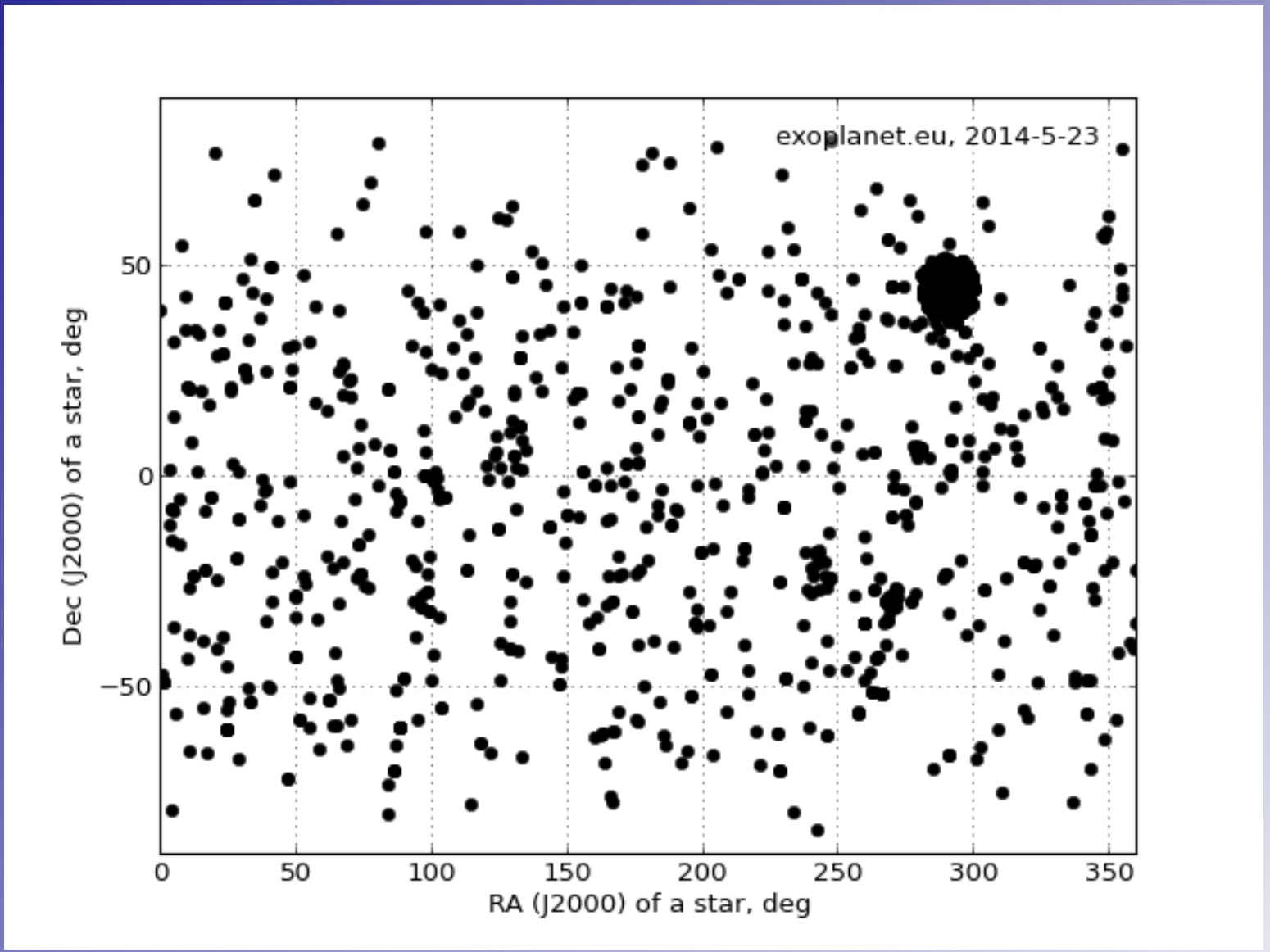
# Tuorla Exoplanet Search

Samuli Kotiranta (Tuorla Observatory)

Astronomer's Days 2014

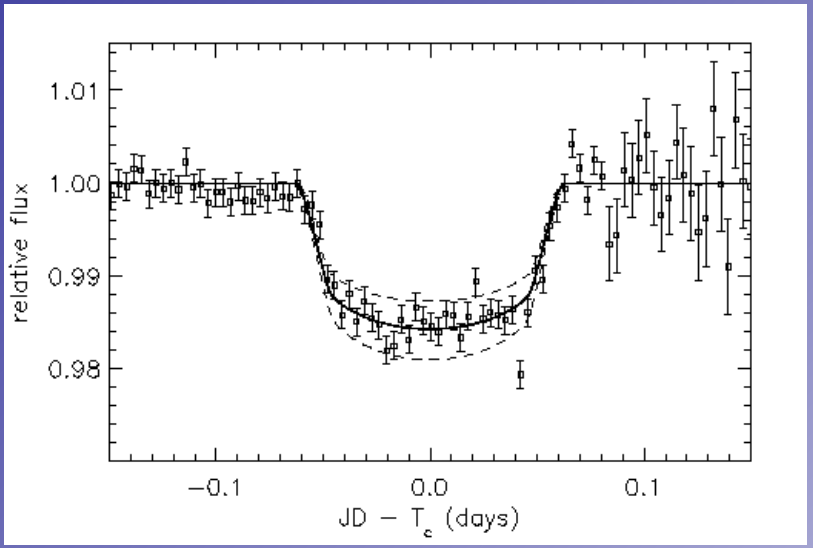
# All known exoplanets on the sky

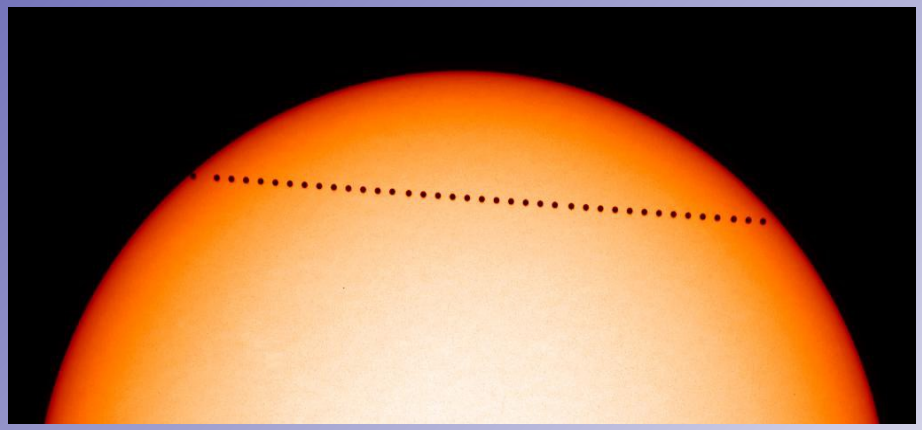


# Transit method

If a planet passes between the star and eye there happens slight dimming

Amount of dimming is related to the size of the planet



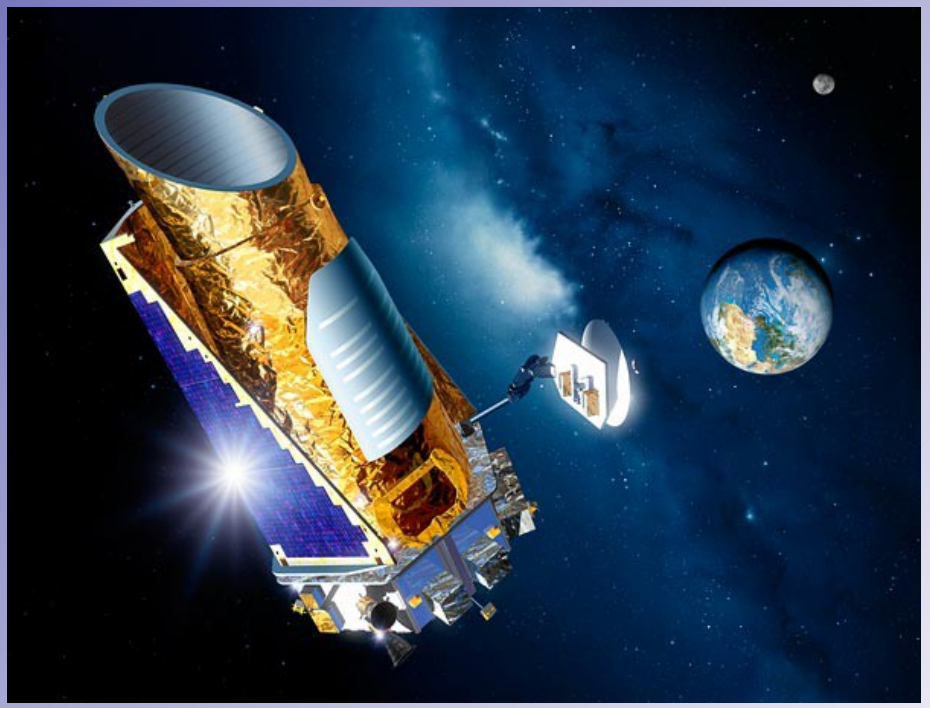



Useful while hunting small planets!

# Transit method

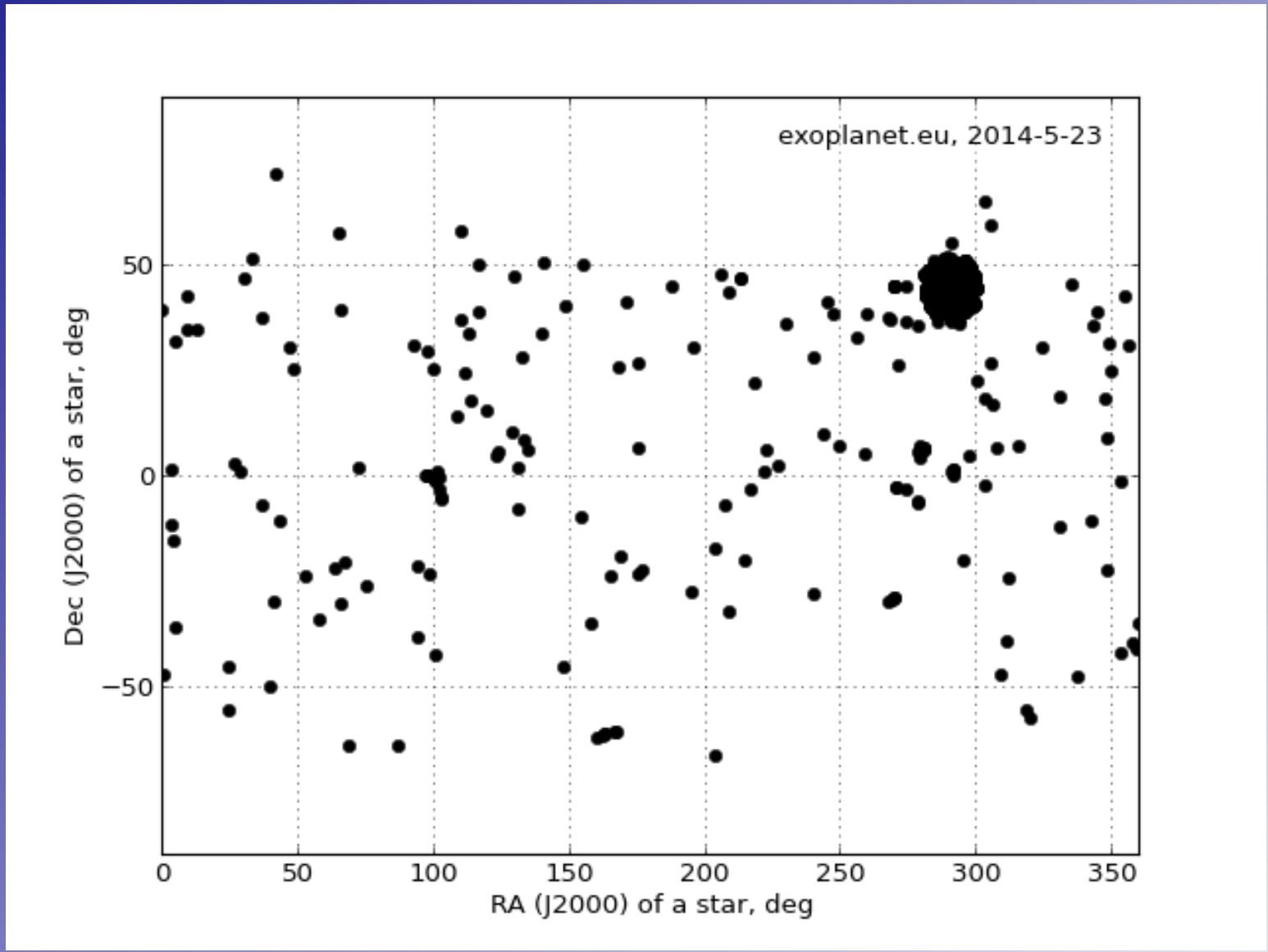
So far 1134 planets in 616 planetary systems seen (not necessarily found!) with TM

- Successful instruments:
  - SuperWASP (UK and ZA)
  - CoRoT (France)
  - Kepler (USA)
  - HAT (Hungary & USA)
  - TrES (USA & Spain)

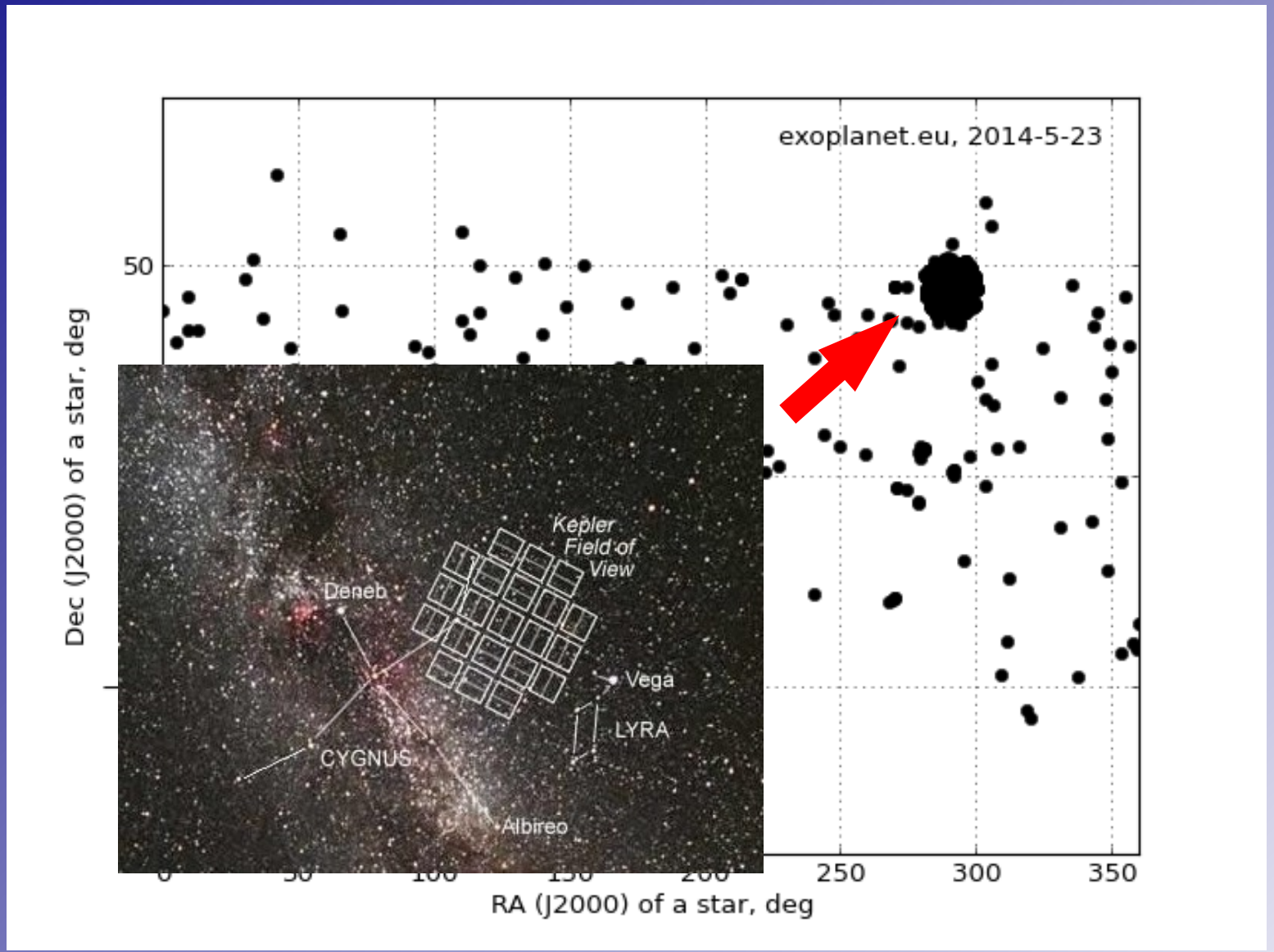


Kepler malfunctioned in May 2013 :(

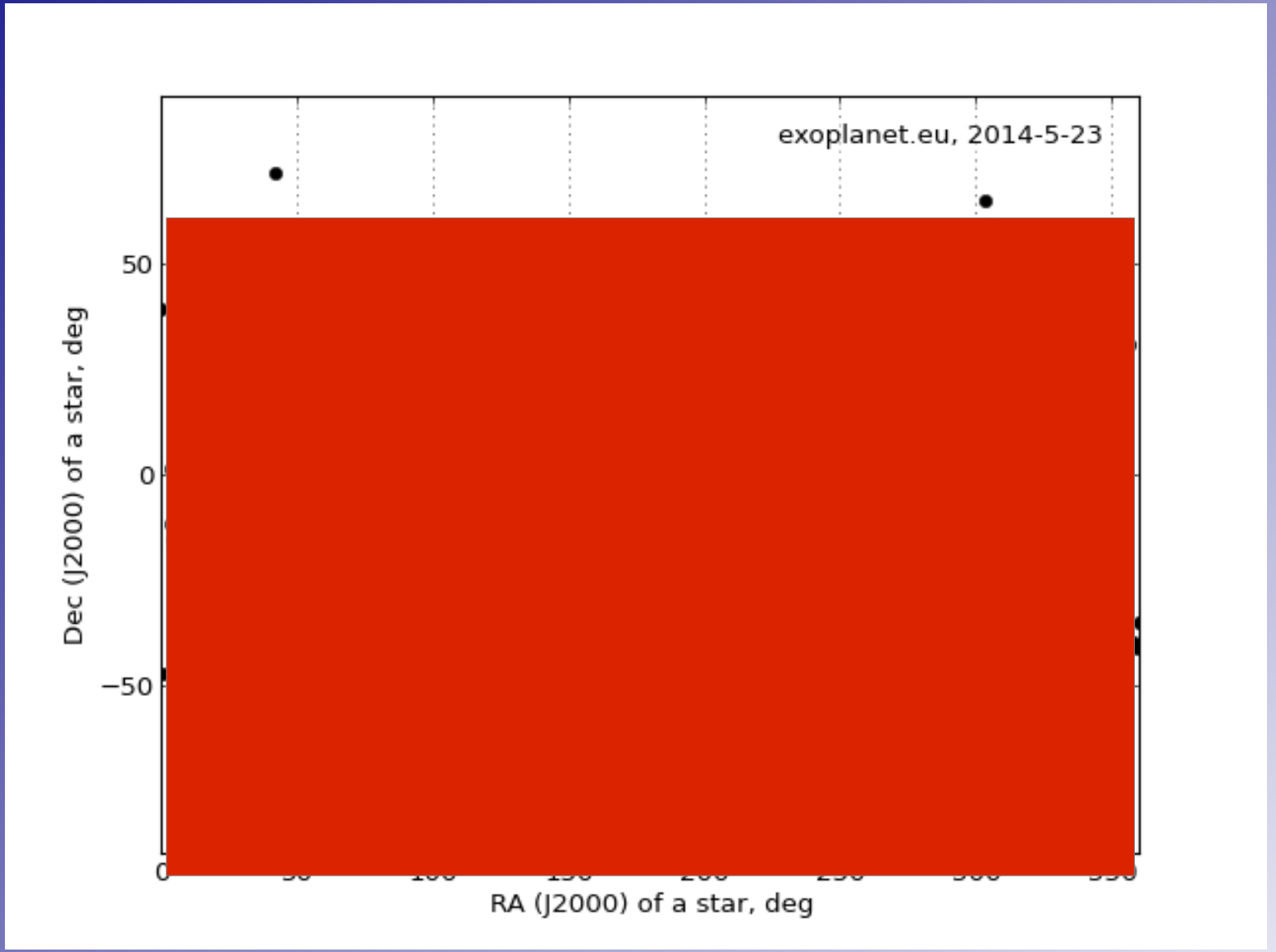
# Transiting exoplanets on the sky



# This is Kepler's Field of View



# Very few transiting planets at declinations higher than +60 deg

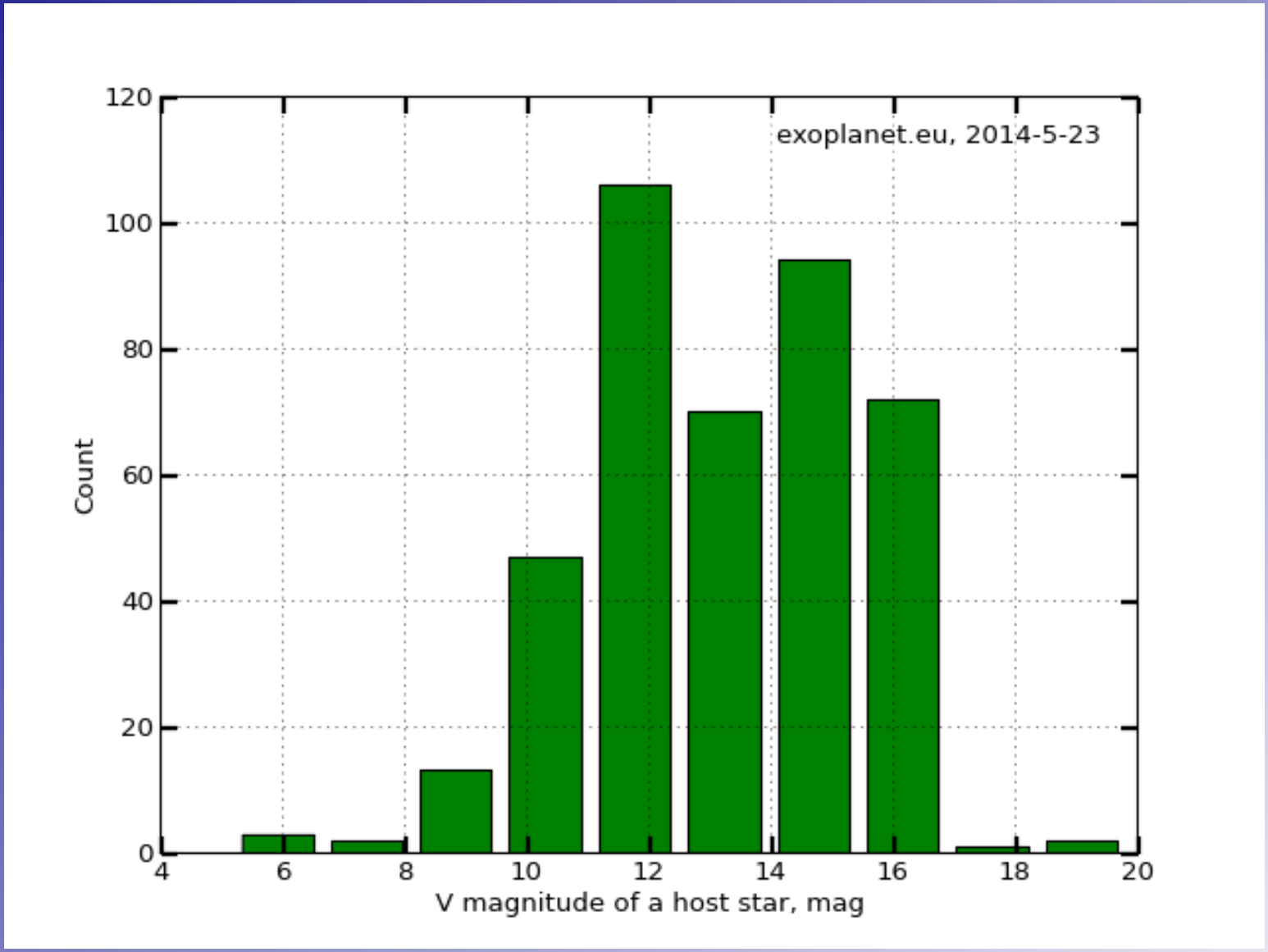


# Tuorla Exoplanet Search

- Photometric study i.e. transit method
- Using Tuorla 0.7m Schmidt telescope
  - Schmidt telescope has wide field
  - Previous example: Kepler satellite

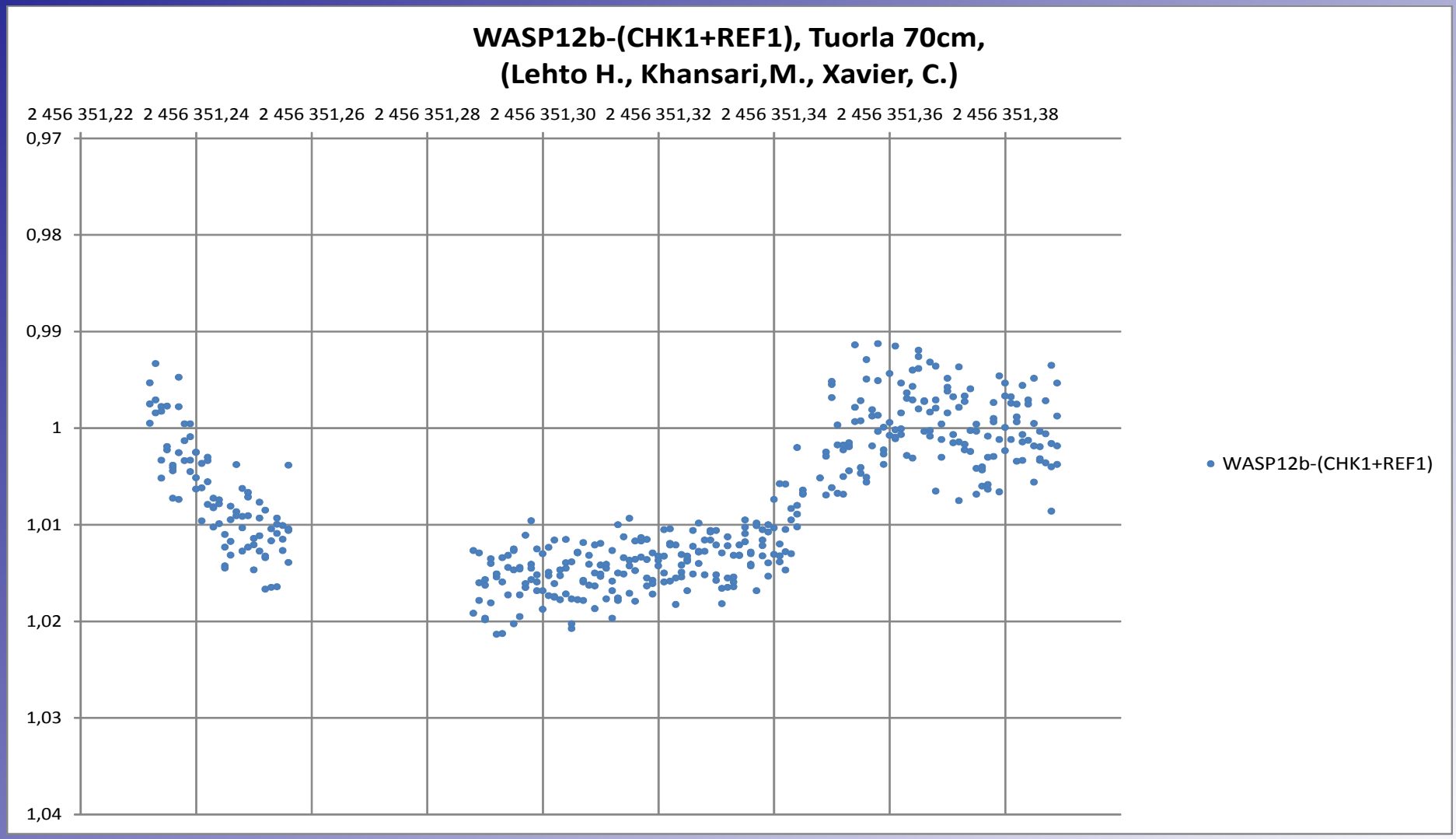

- Location: 60°24′ N,22°26′ E
- Limiting magnitude ~18

# Host stars are generally brighter than V=18

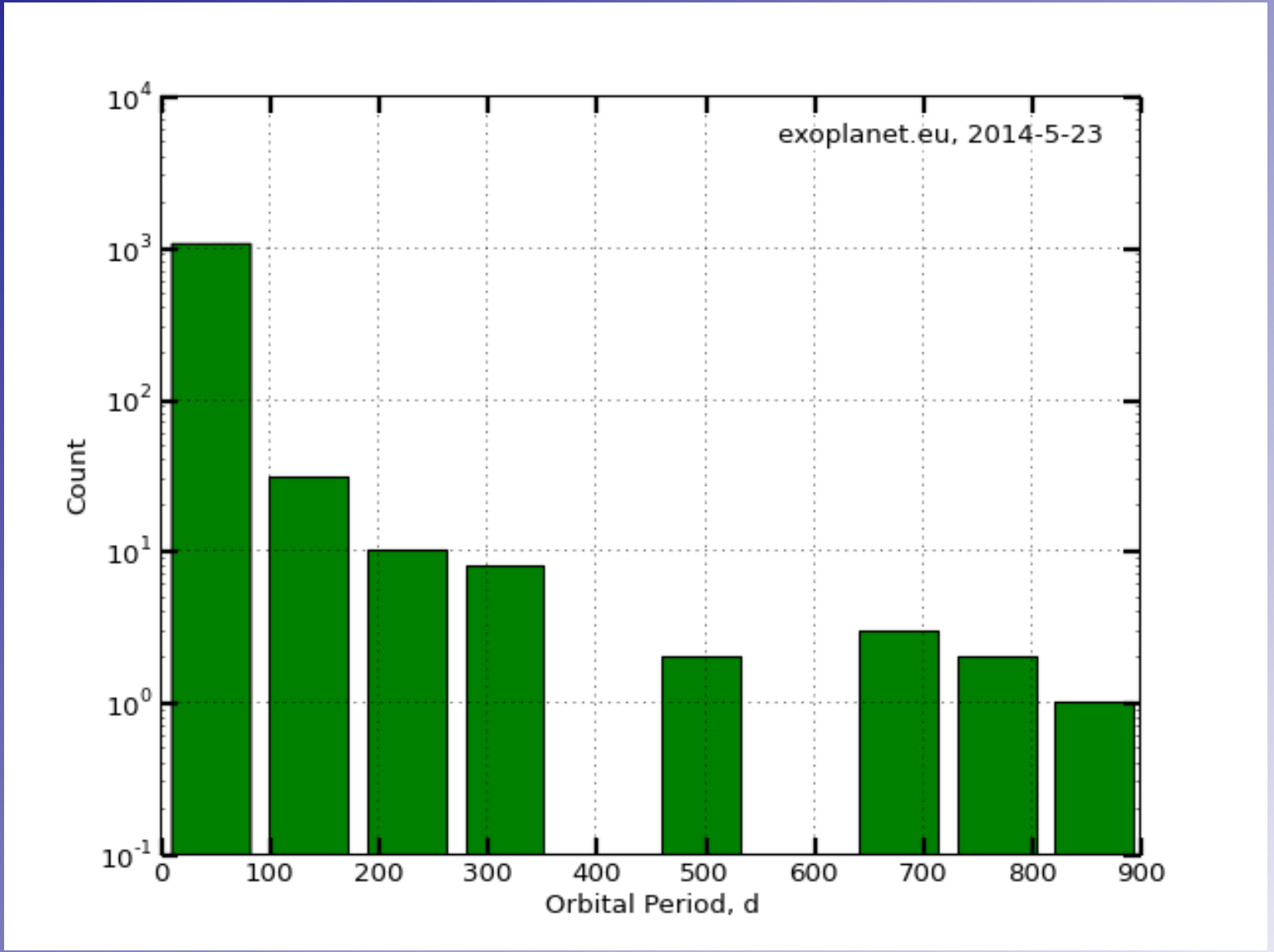


# Transits can actually be seen from Tuorla

- Example: WASP-12 b transit (V = 11)



# There is number of planets with very short period orbits



# Tuorla Exoplanet Search

Problem: summertime :(

Midnight in Malax
June 21th 2013

# Tuorla Exoplanet Search

Possible solution: 紫金山天文台 or Purple Mountain Observatory (PMO)

- Headquarters (and old observatory) in Nanjing, China

Useful observatory at Xuyi
32°44′N 18°28′E

# Tuorla Exoplanet Search

- Main instrument: 1.20 m Schmidt telescope
- National forest → Very dark place!
- Magnitude limits:

  (V,B) = (20.78, 21.38) for CCD photometry

Disadvantage: While summer, northern targets are at relatively low elevation

# Tuorla Exoplanet Search

- More telescopes involved = less weather dependence = more complete time series
- Notable amounts of data is expectable
  - Data storage (CSC has great volume available per user)
  - Automatic pipeline for analyzing the observations is MUST but will be challenging
  - Use for Bayesian methods and neural networks

… and funding...