# Towards turning WD 1145+017 into a class

John Arban Lewis

Advisor: John Johnson

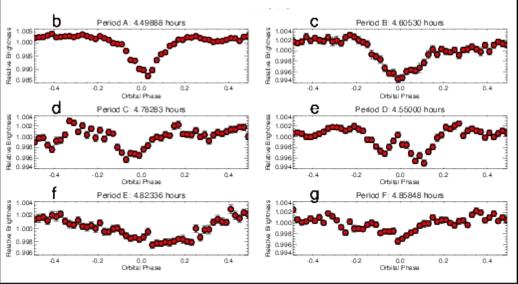


WD+IRx

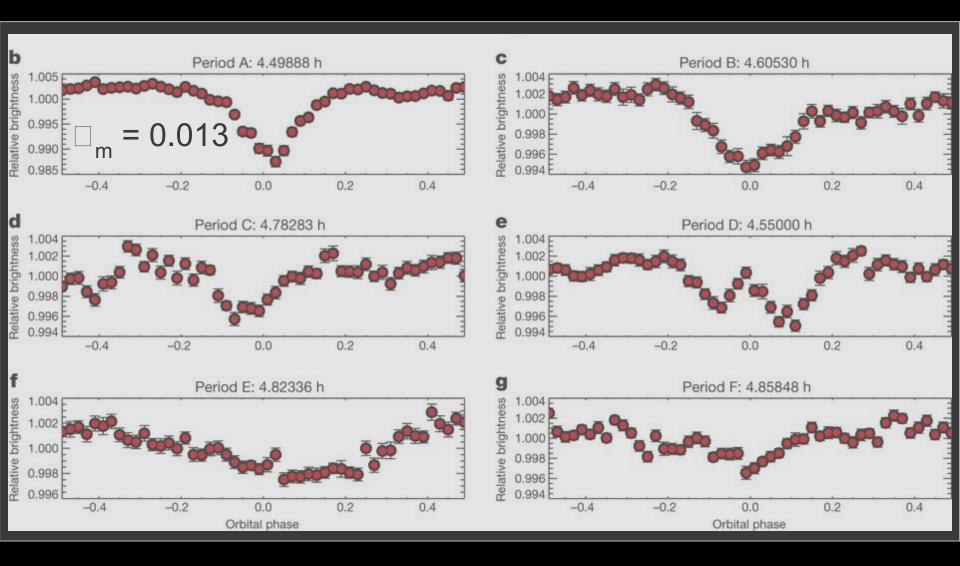
### What is WD 1145+017

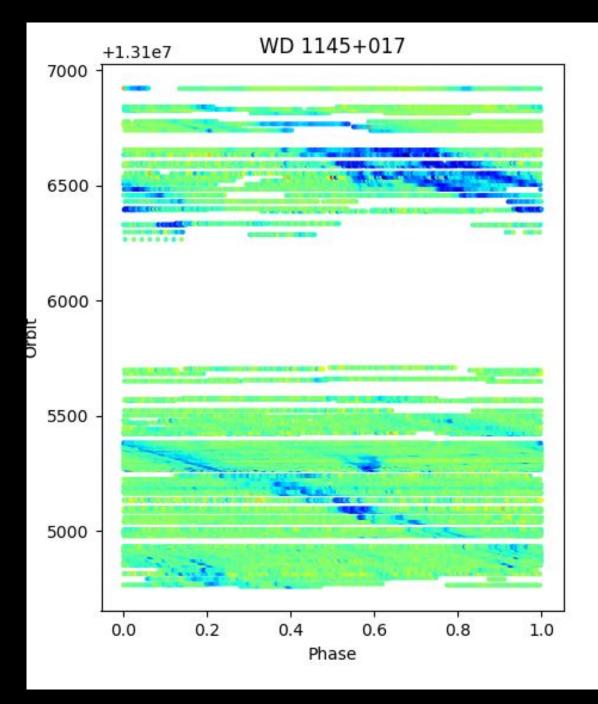
- DBZA @ 174 pc
- T ~ 15900 K
- Metal polluted
  - O, Mg, Al, Si, Ca, Ti,
    Cr, Mn, Fe, Ni
    (Xu et al, 2016)
- Infrared Excess



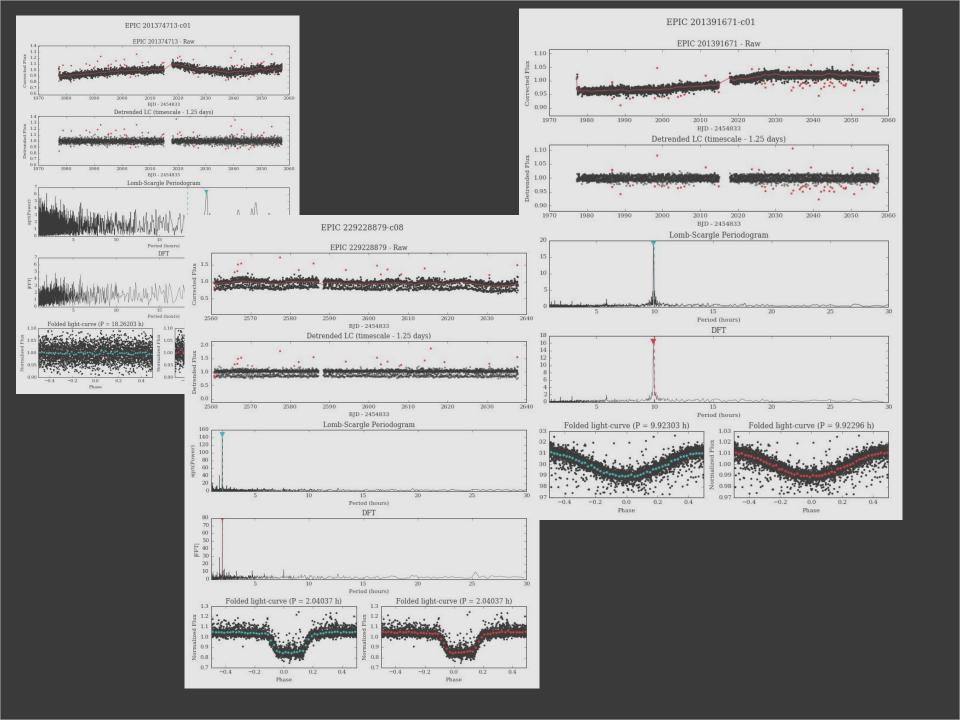


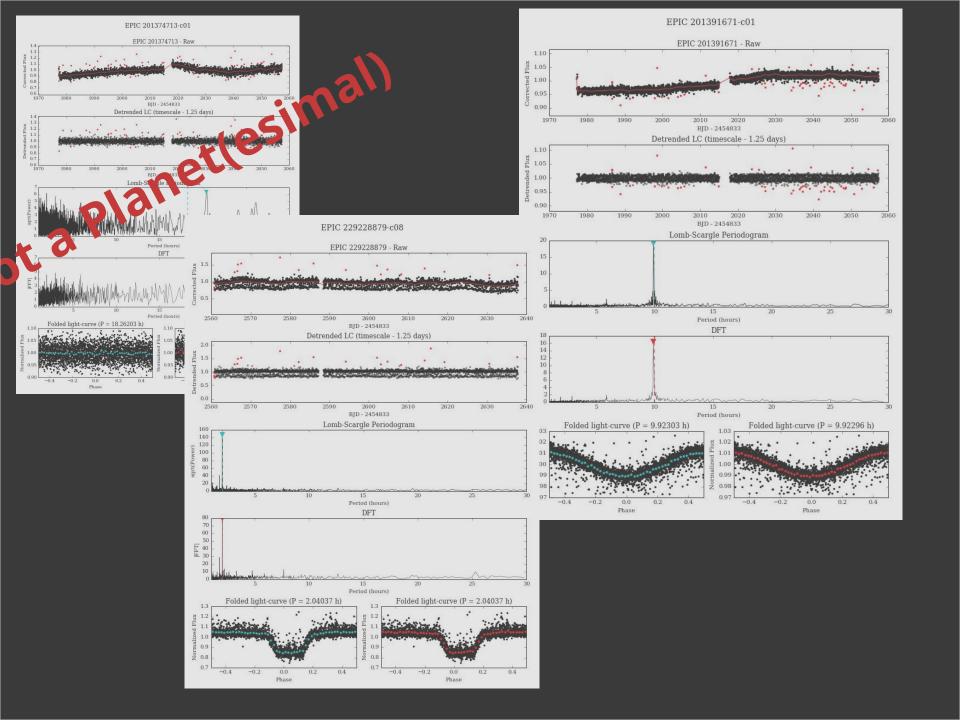
### What is WD 1145+017

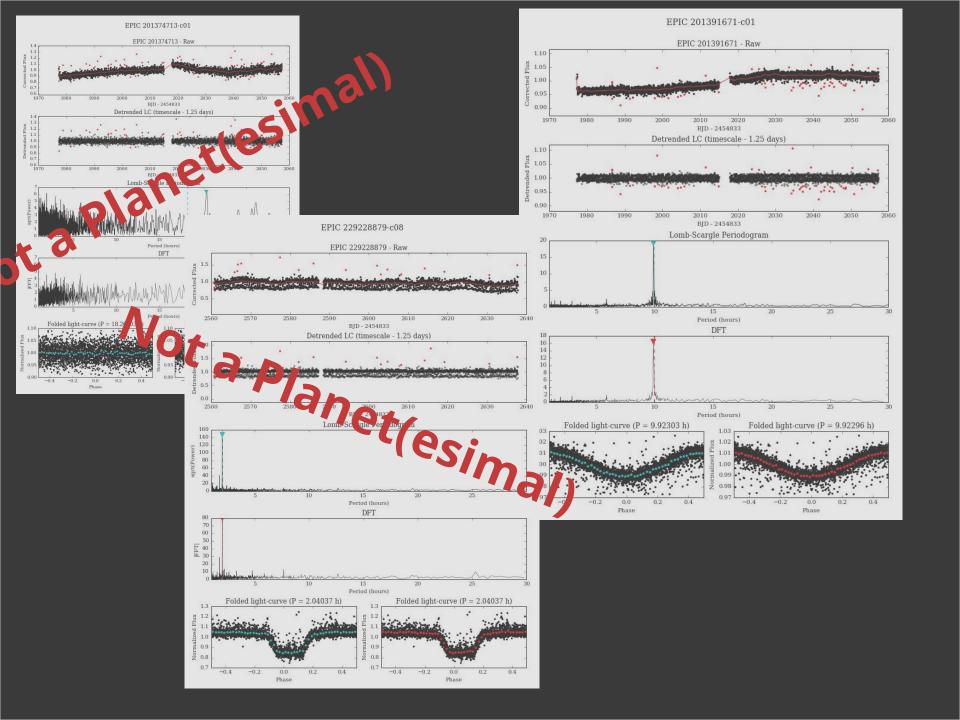


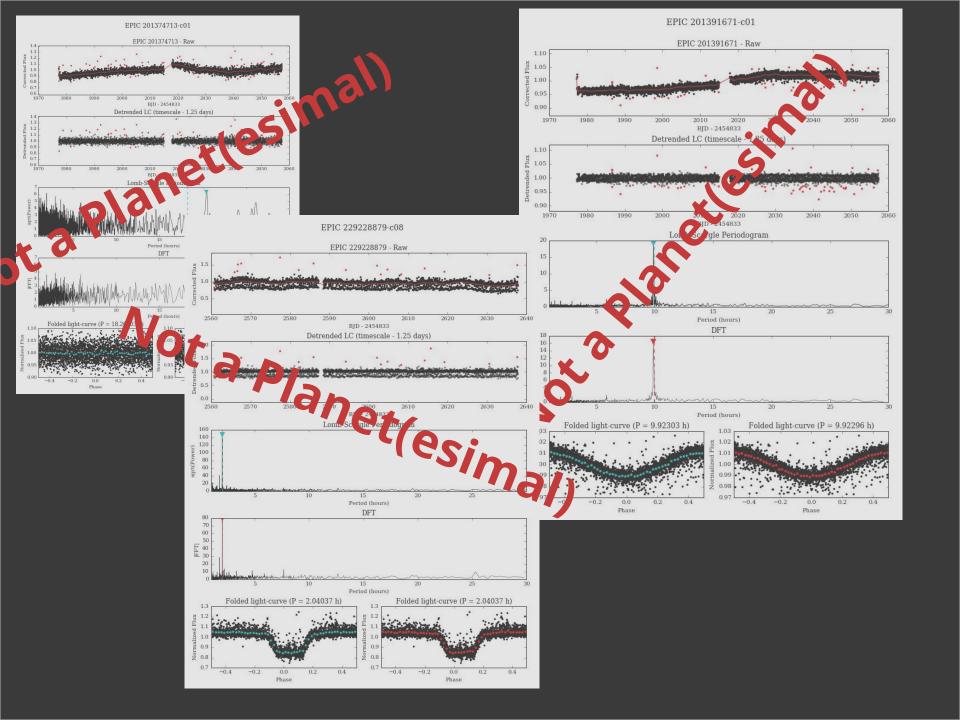


## What about the rest of K2?









$$rac{2\delta}{t^{t-t}_{ ext{mid}}} = rac{t-t_{ ext{mid}}}{t_{ ext{in}}}$$

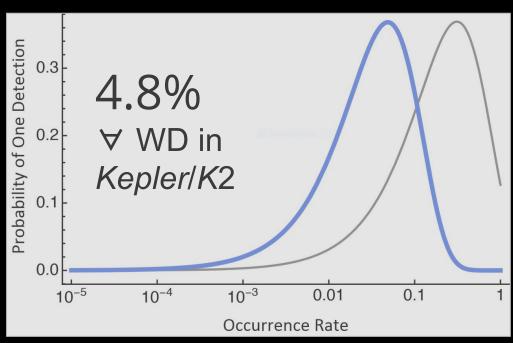
### What can we say so far?

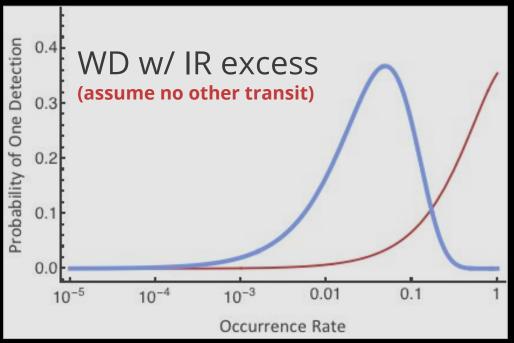
$$T(t)\otimes - ext{Rect}(t) \ 1 - \Deltaig(e^{w/t_{ ext{in}}}\ _2F_1(1.,b,c,-e^{z_2}) - 2F_1(1.,b,c,-e^{z_1})ig)$$

### Occurrence rates

- Assume p<sub>transit</sub> ~ 0.2R<sub>dust</sub>~R<sub>WD</sub>
- N = 1026 (C0-C9)

 To get meaningful statistics relative for infrared debris disks require N<sub>IRx</sub>>100

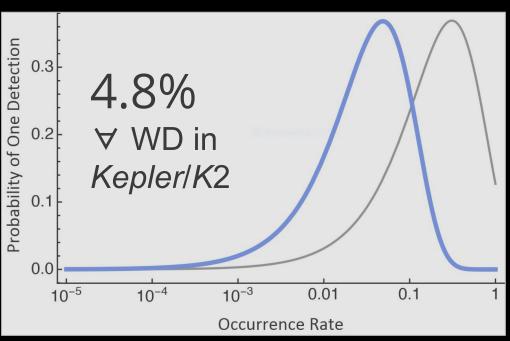


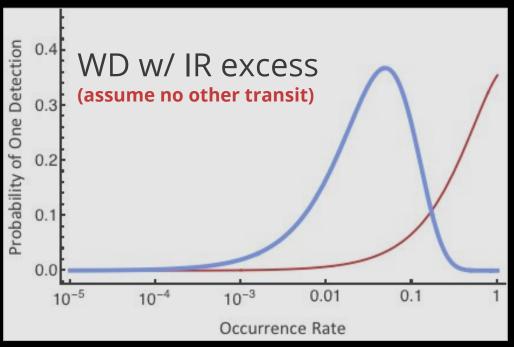


### Occurrence rates

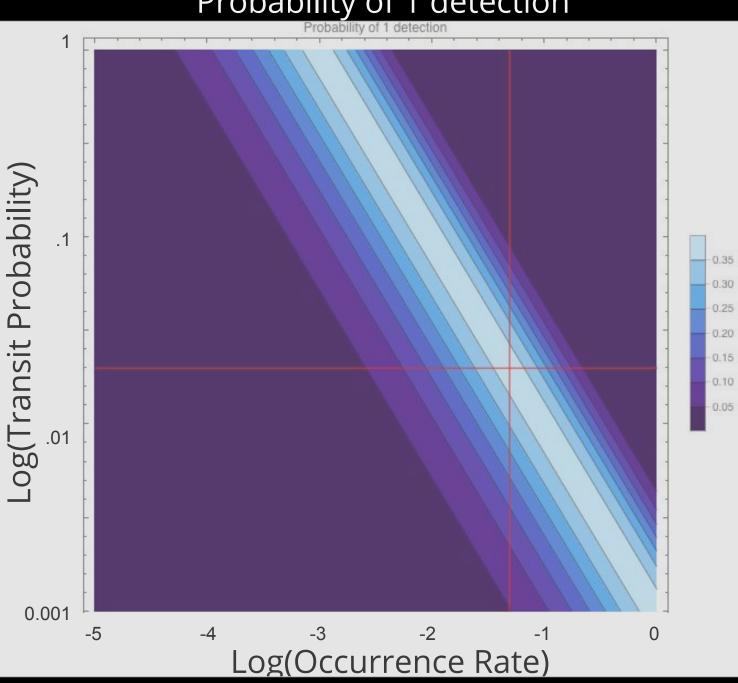
- Assume p<sub>transit</sub> ~ 0.2
  - $\circ$   $R_{dust} \sim K_{WD}$
- N = 1026 (C0-C9)

 To get meaningful statistics relative for infrared debris disks require N<sub>IRx</sub>>100





Probability of 1 detection



# 5-10%

Occurrence rate of transiting disintegrating planetesimals around white dwarf stars

## 5-10%

Occurrence rate of transiting disintegrating planetesimals around white dwarf stars

#### **TODO**

Clean-up K2 white dwarf sample Separate out DZs

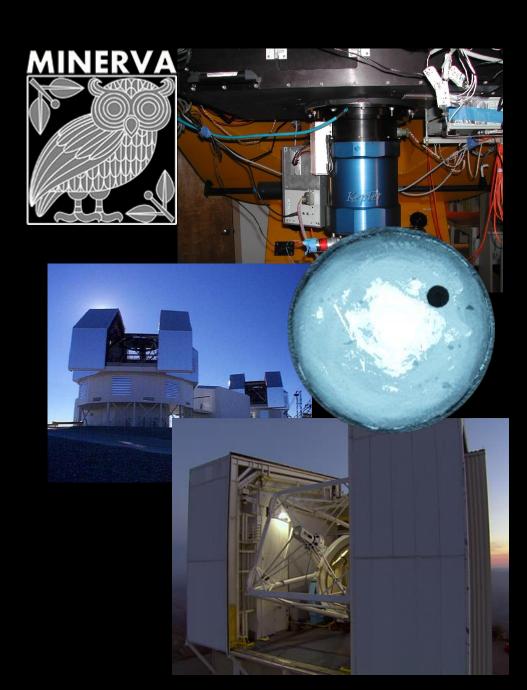
# The following is very preliminary

## (Proposed) Survey

- To properly do statistics we need >100 IRx WDs
- More critically, to find more WDs + planetesimals, we need a biased survey
- spectroscopic & photometric survey

#### Selection

- D(A/B)Z white dwarfs
- Preliminary targets:
  - Known IRx sources
  - Sources with circumstellar gas & weak IRx



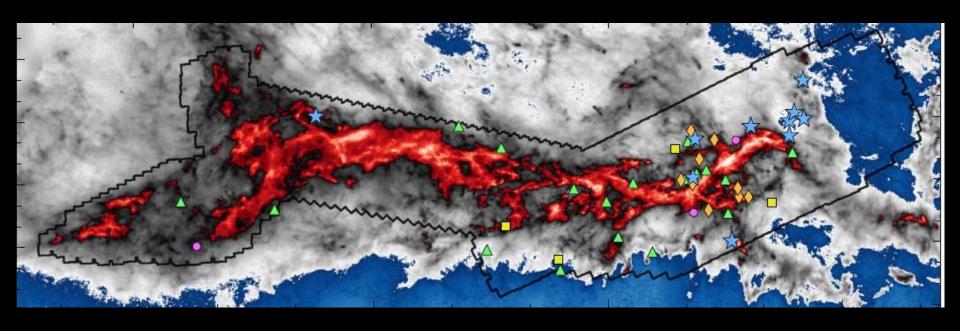
### Some goals of this survey

- Spectroscopic monitoring of changes in metal lines
  - DAs accretion rate changes
  - DBs accretion, & perhaps RV signals (see Dan Maoz's talk)
- Photometric monitoring
  - Transit/variability search

#### Questions

- Southern Sky DZs, are there enough known?
- Using circumstellar gas to select for transits?

#### **Orphan Protostars**



Lewis & Lada 2016

What effect does getting kicked out of the core have on the production/evolution of planetary systems?



