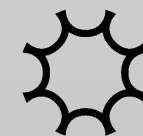


U

Prospects for detecting
planets around red-giant
stars

B

Thomas North
Bill Chaplin
HiROS

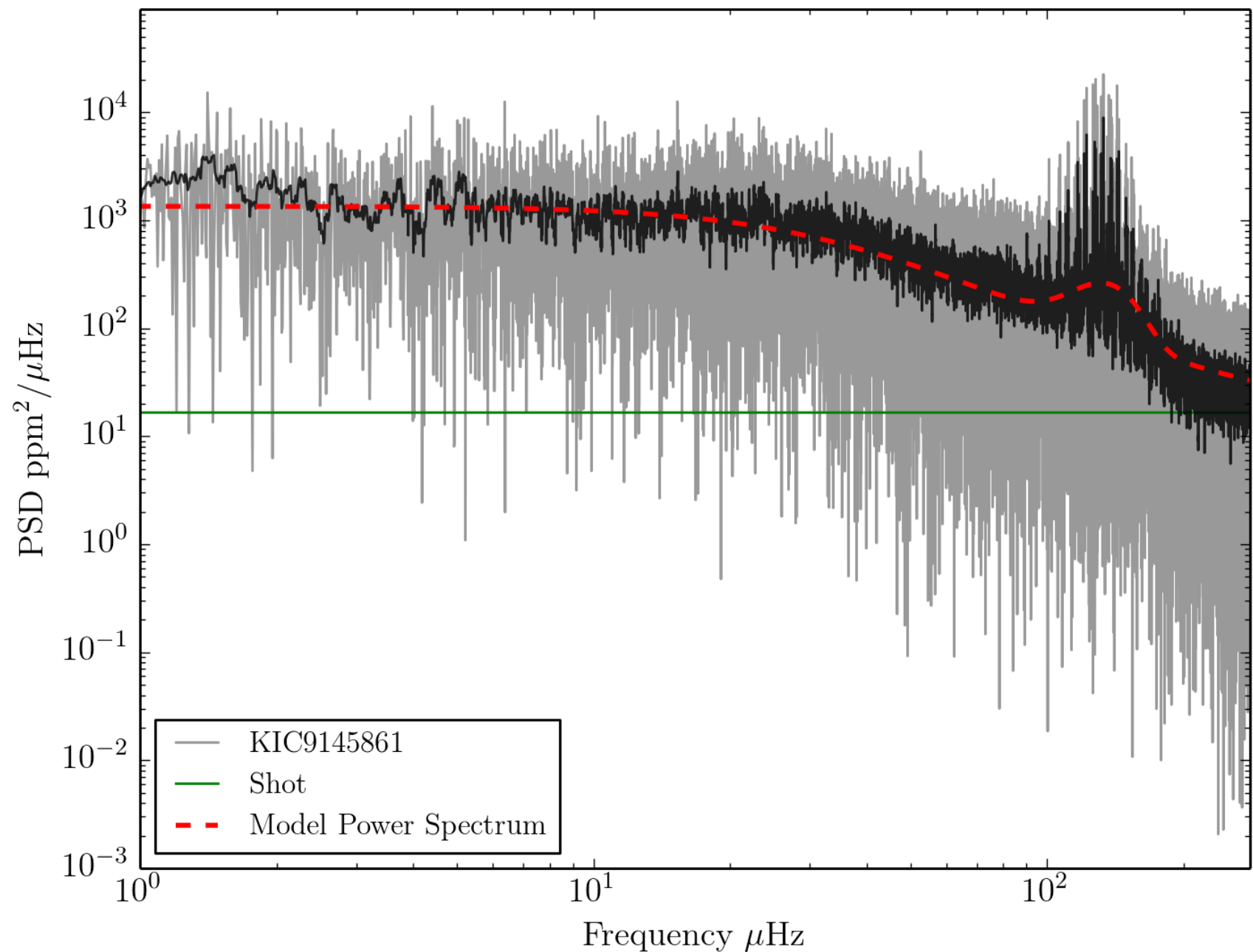


Objectives

- » *Kepler* has allowed characterisation of over 13,000 red giants using asteroseismology
- » Interest now in planet population orbiting these stars
- » Only a handful detected so far by transits
- » Now searching for overlooked planets
- » Well constrained stellar parameters allow;
 - constrained planet parameters
 - additional physics e.g. spin orbit misalignment...*Kepler-56*
- » Need underlying population model
- » Need accurate noise model

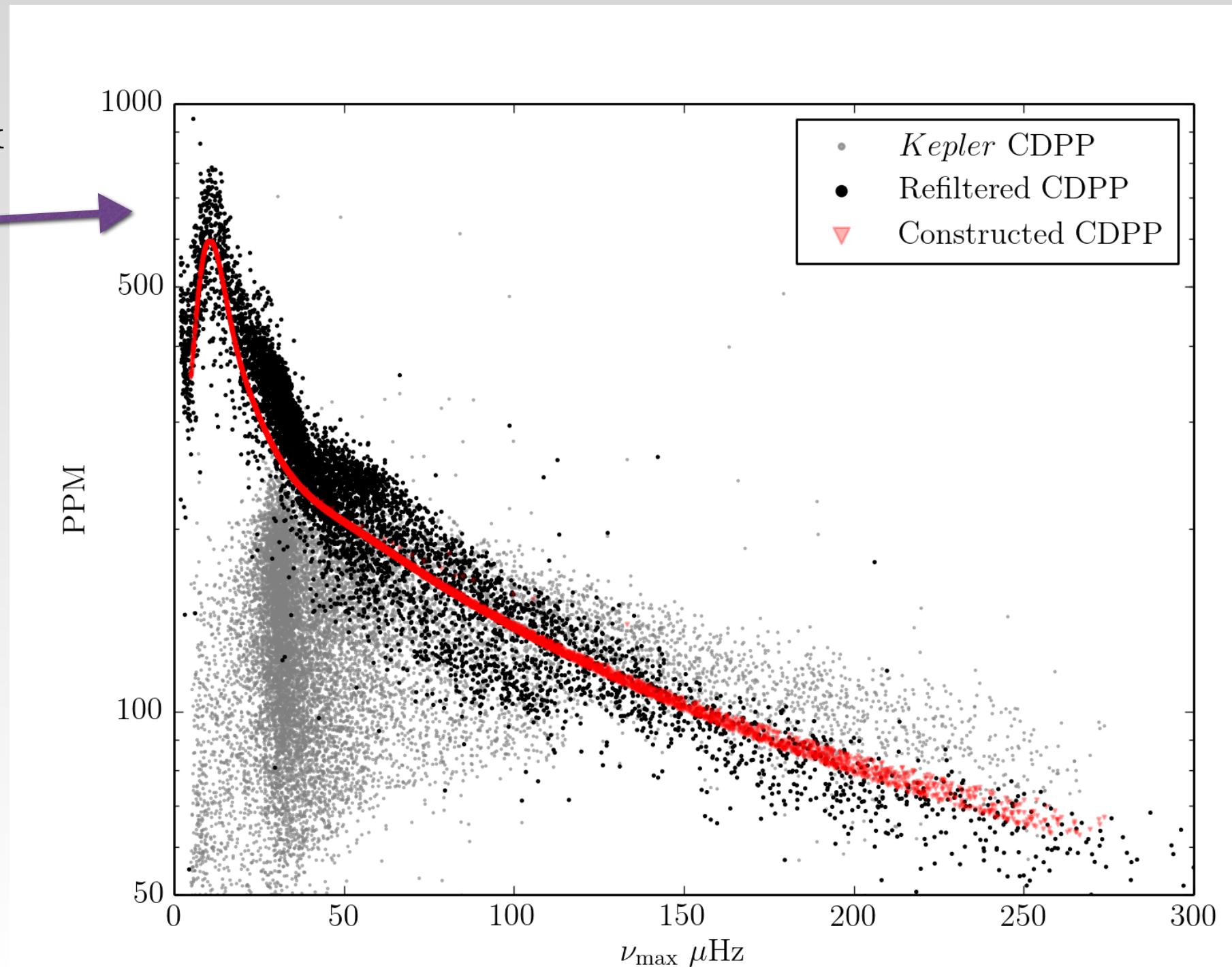
Noise model

- » Granulation becomes important at low frequencies
- » Stellar oscillation signals also enter frequency window, characterised by power excess around frequency of maximum power ν_{\max}



CDPP-Combined Differential Photometric Precision

- » Shows clear trend with ν_{\max}
- » 'Knee' in distribution due to oscillation envelope passing through filter

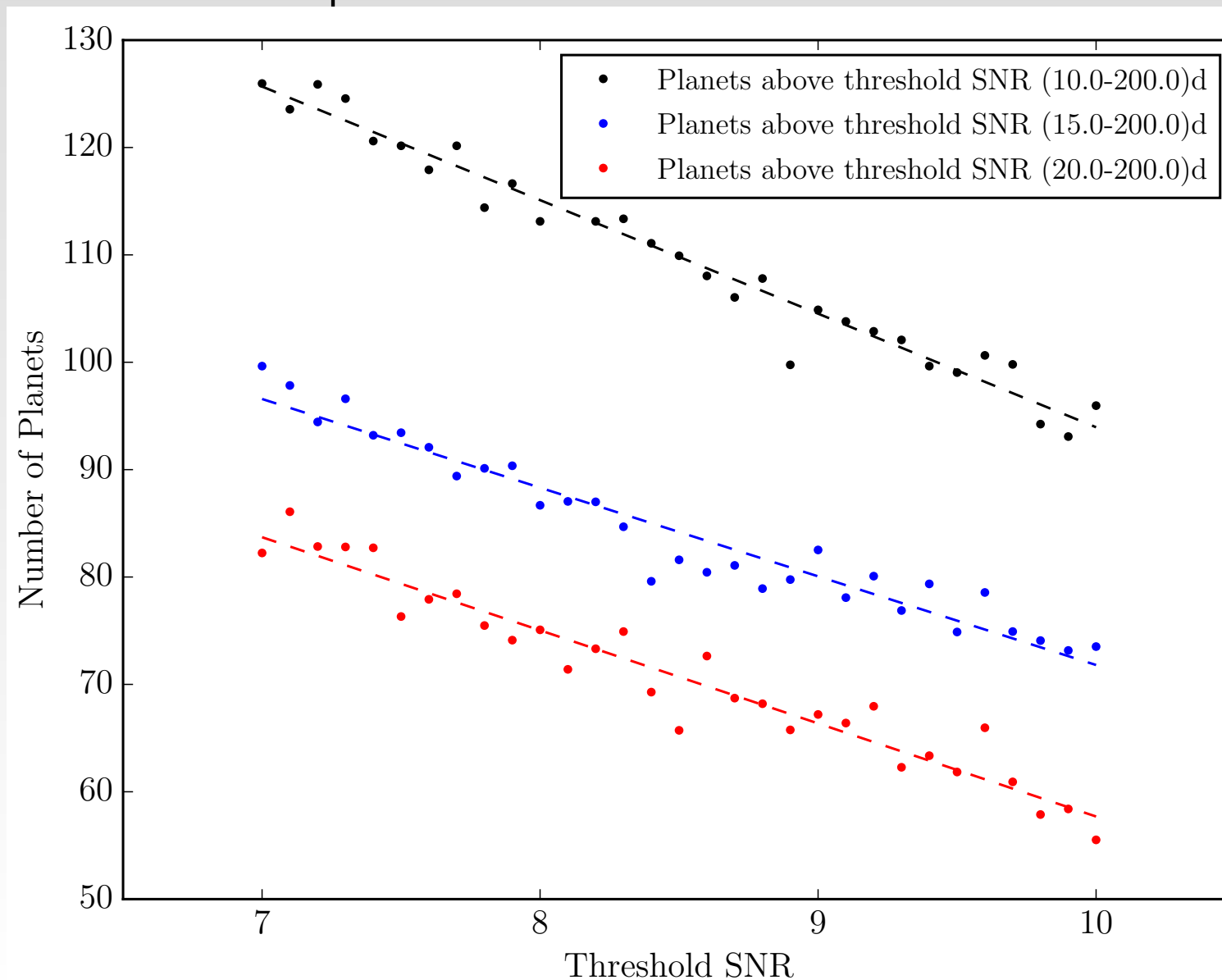


Model

- » Underlying assumptions
 - » New noise metric represents stellar noise accurately
 - » 10% occurrence rate
 - » Uniform distributions in $\log P$
 - » Uniform distribution in $R_P = 3 \leq R_{\oplus} \leq 15$
 - » Uniform inclination distribution in $\cos i$
 - » Circular orbits
 - » Single planet systems
 - » Grazing transits allowed
 - » Quadratic limb darkening

Model Results

- » Ran 25 times per 0.1 SNR step $7 \leq SNR \leq 10$
- » Sensitive to period distribution



What's Next?

- » Account for grazing transits
- » Minimum period considerations
- » Explore other planet distributions, inclusion/exclusion of Hot Jupiters?
- » Explore new filters to characterise stellar noise, including granulation and oscillation noise
- » Multi-planet systems
- » Spin-orbit (mis)alignment

Questions?