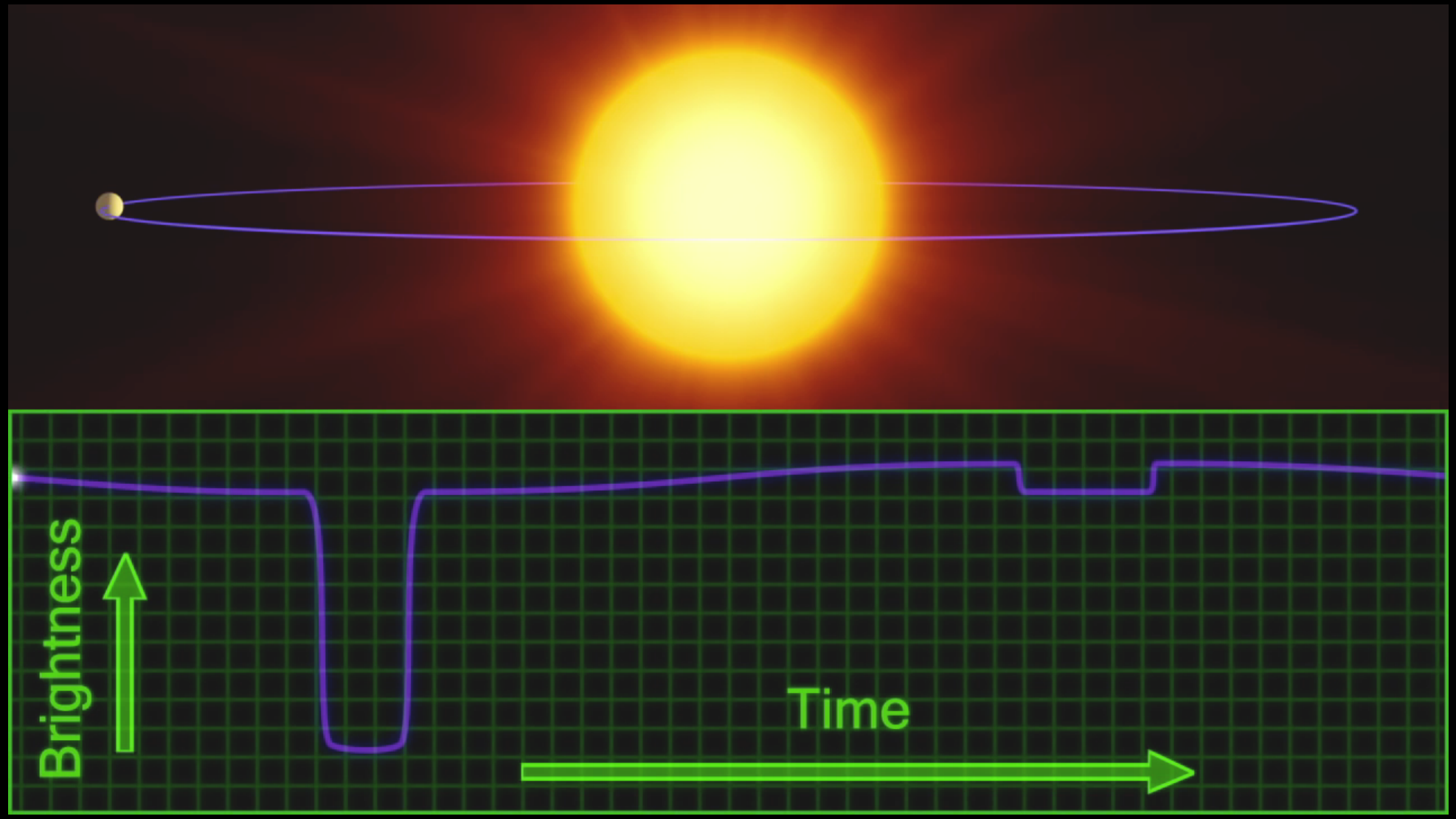
Deep Learning with Kepler

Jon Zink

Transits Block Star Light



Nasa Spitzer
YouTube (2013)

Multiples Block Light More Often

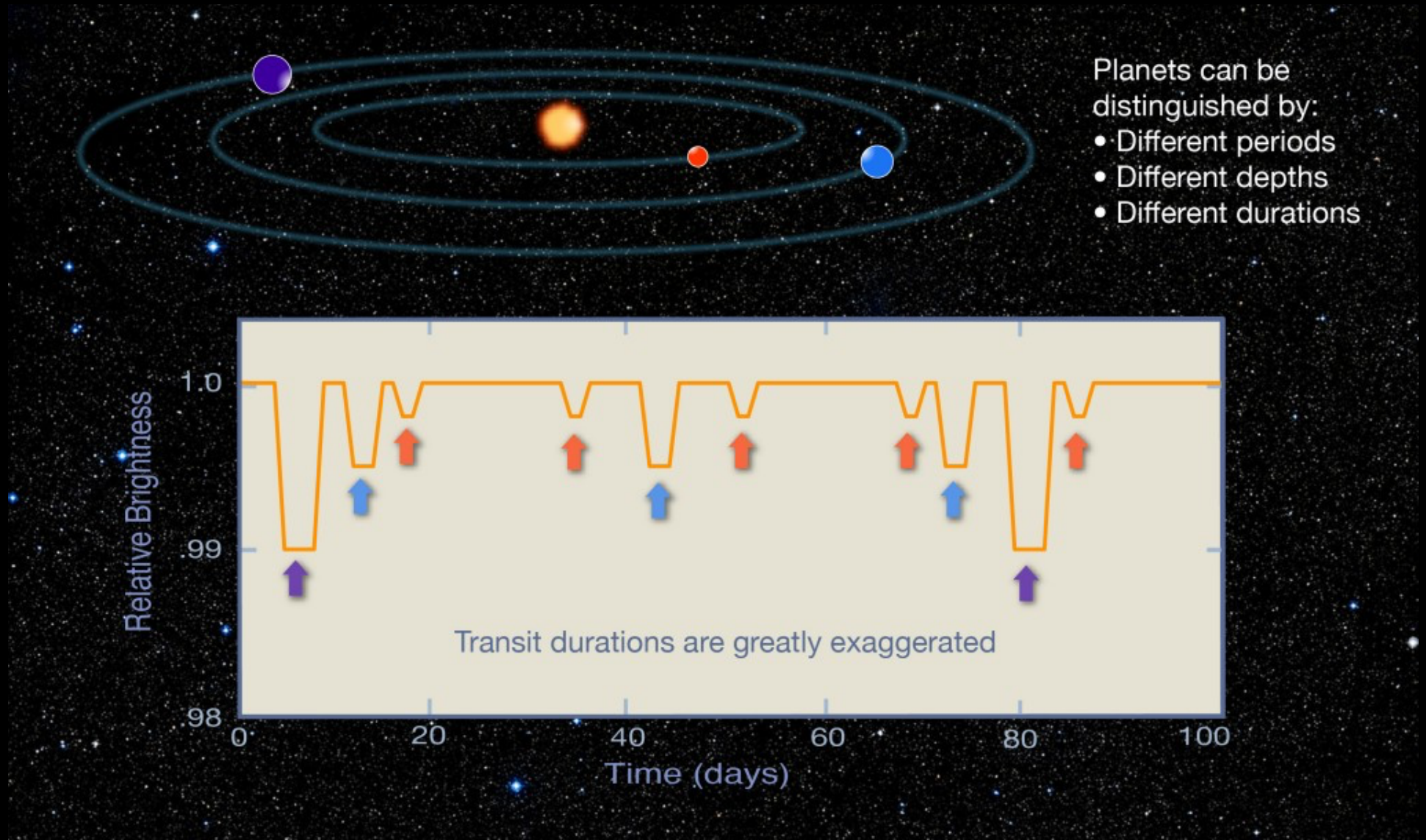
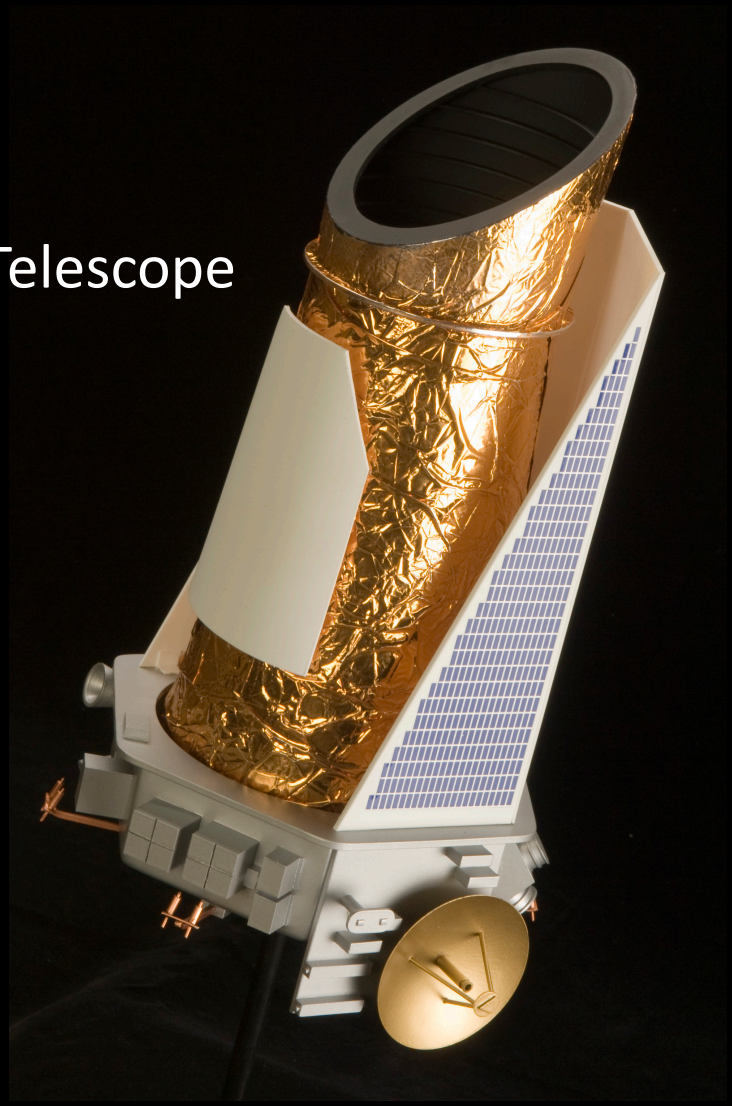


Image credit: NASA / Kepler Mission.

Really Focusing On One Patch

Kepler Space Telescope



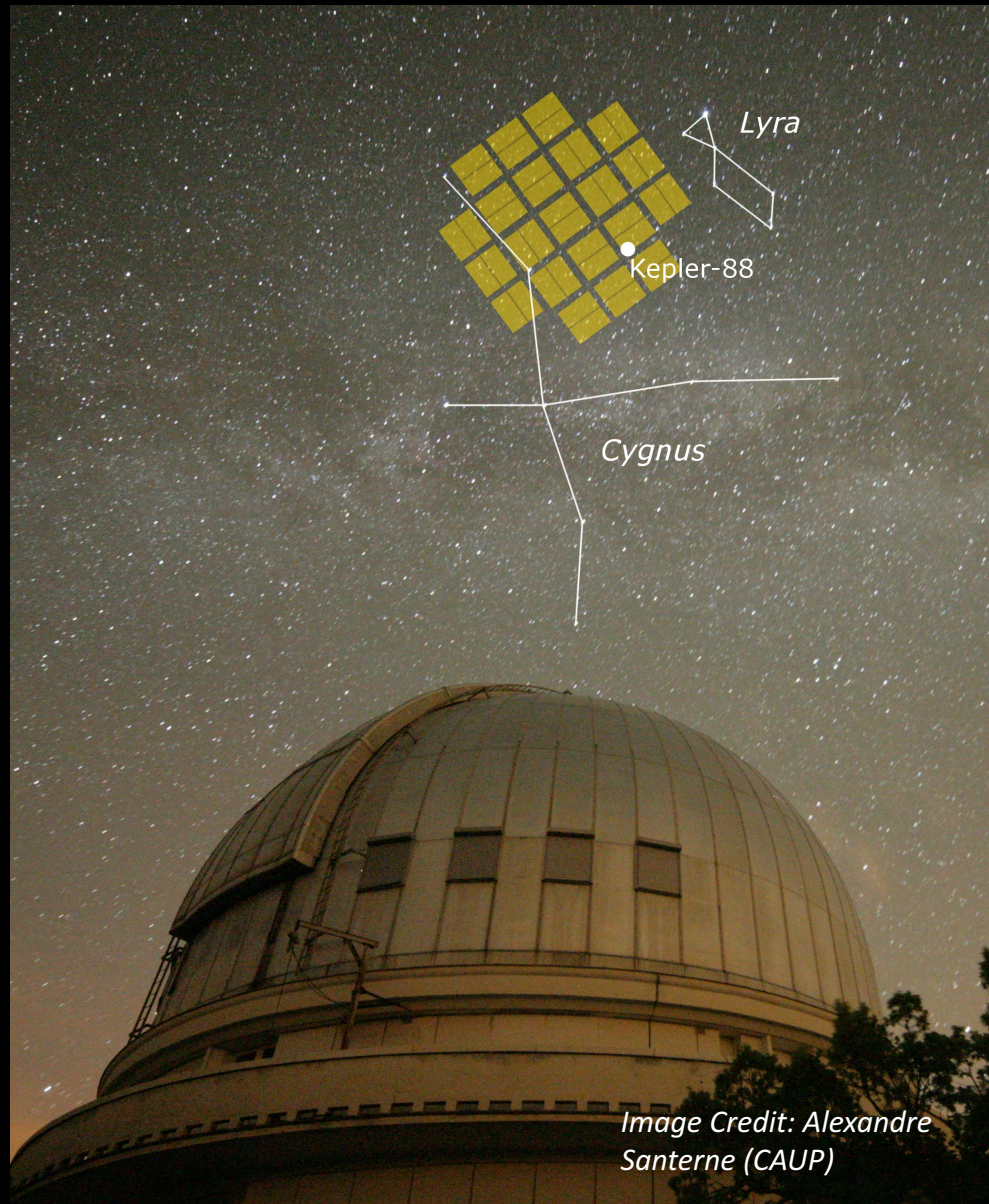
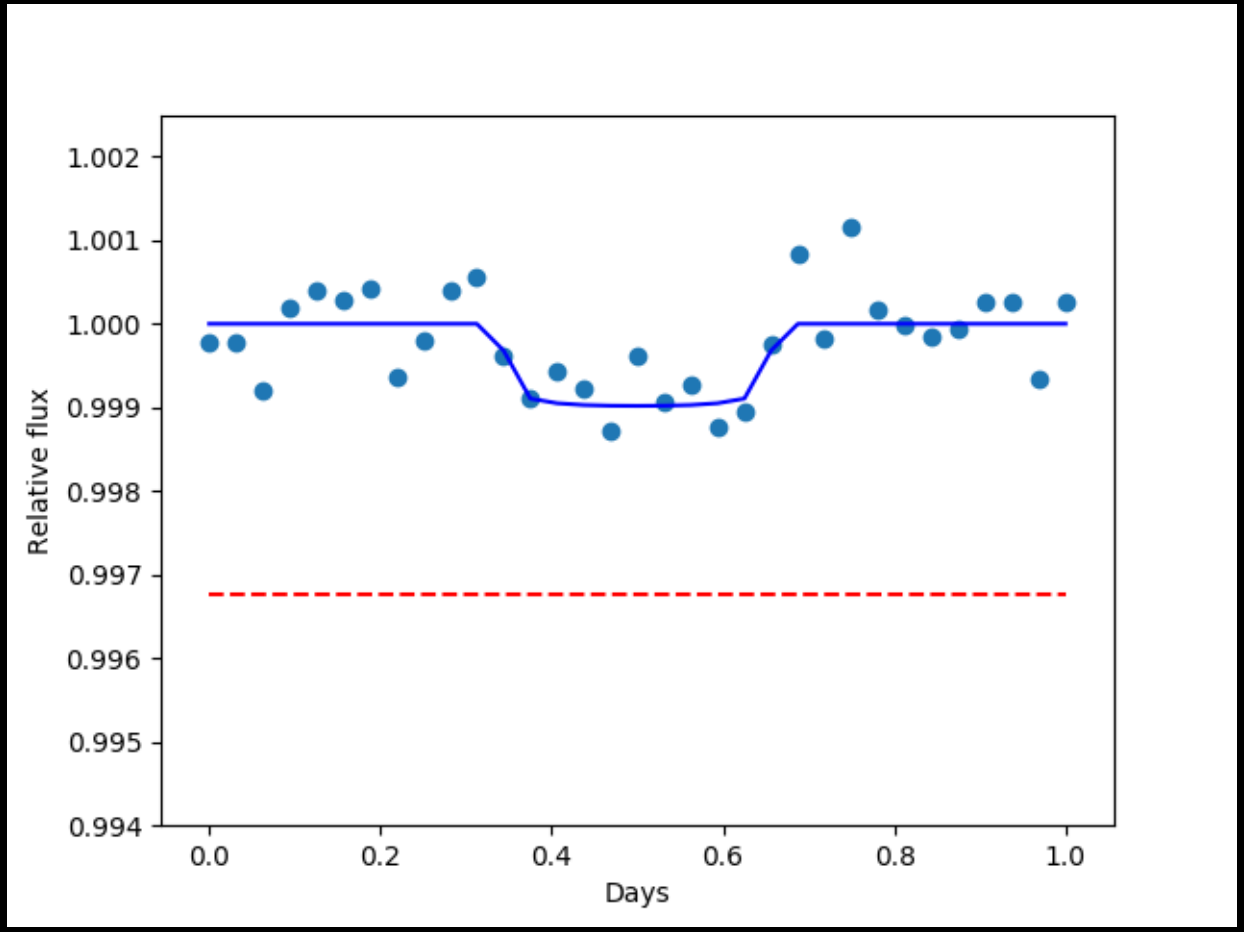
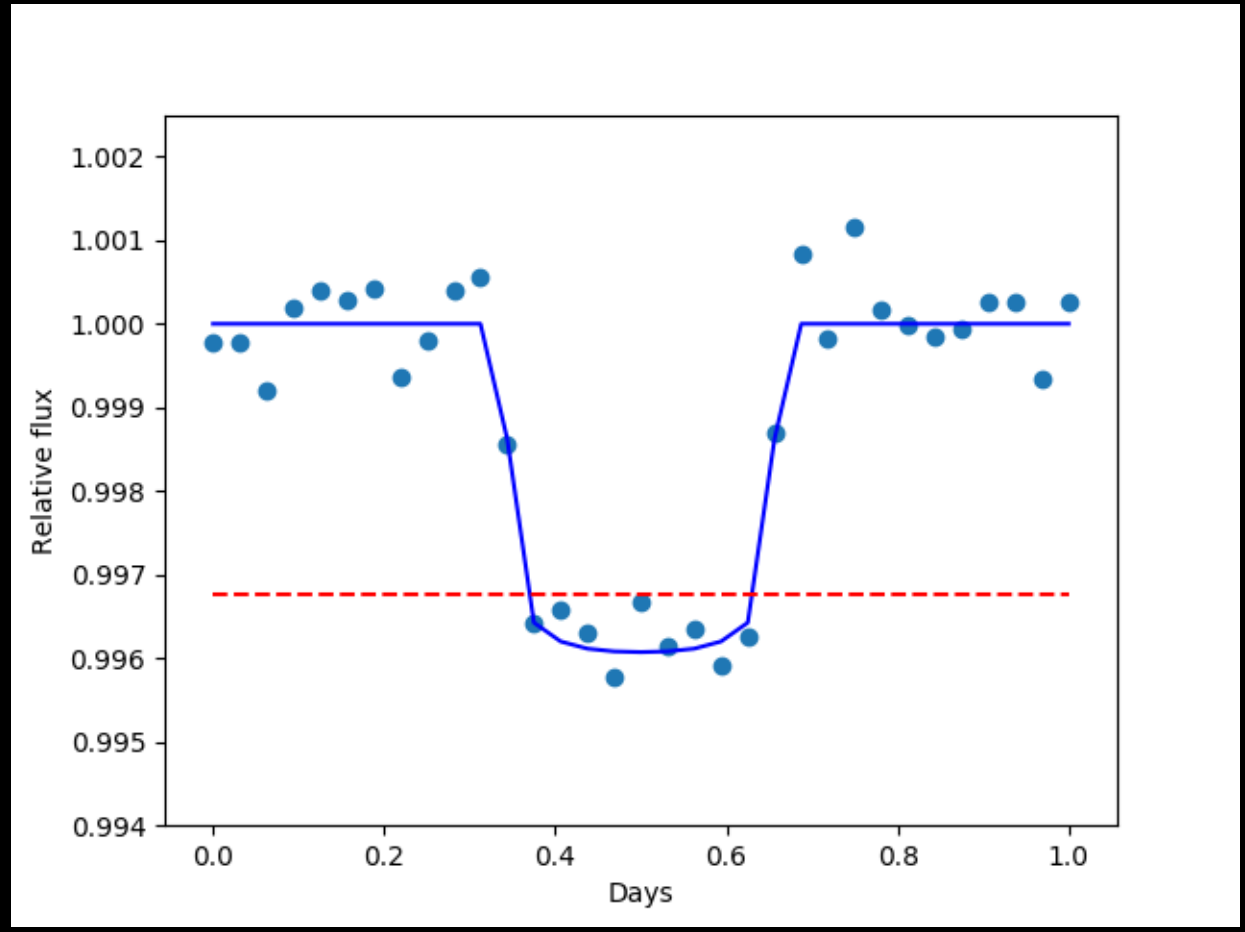


Image Credit: Alexandre Santerne (CAUP)

Threshold Crossing Events (TCE)

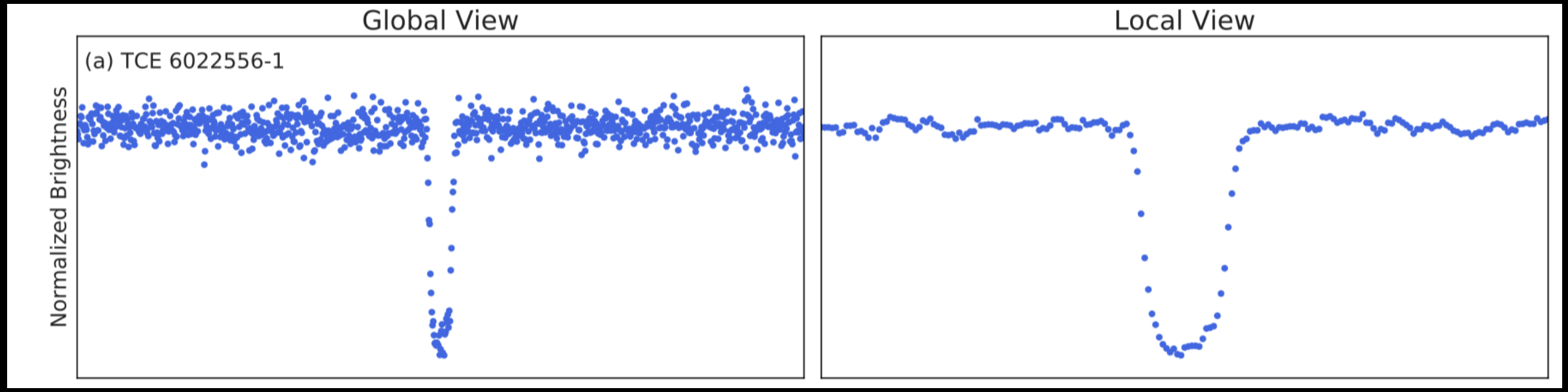


Wouldn’t be considered

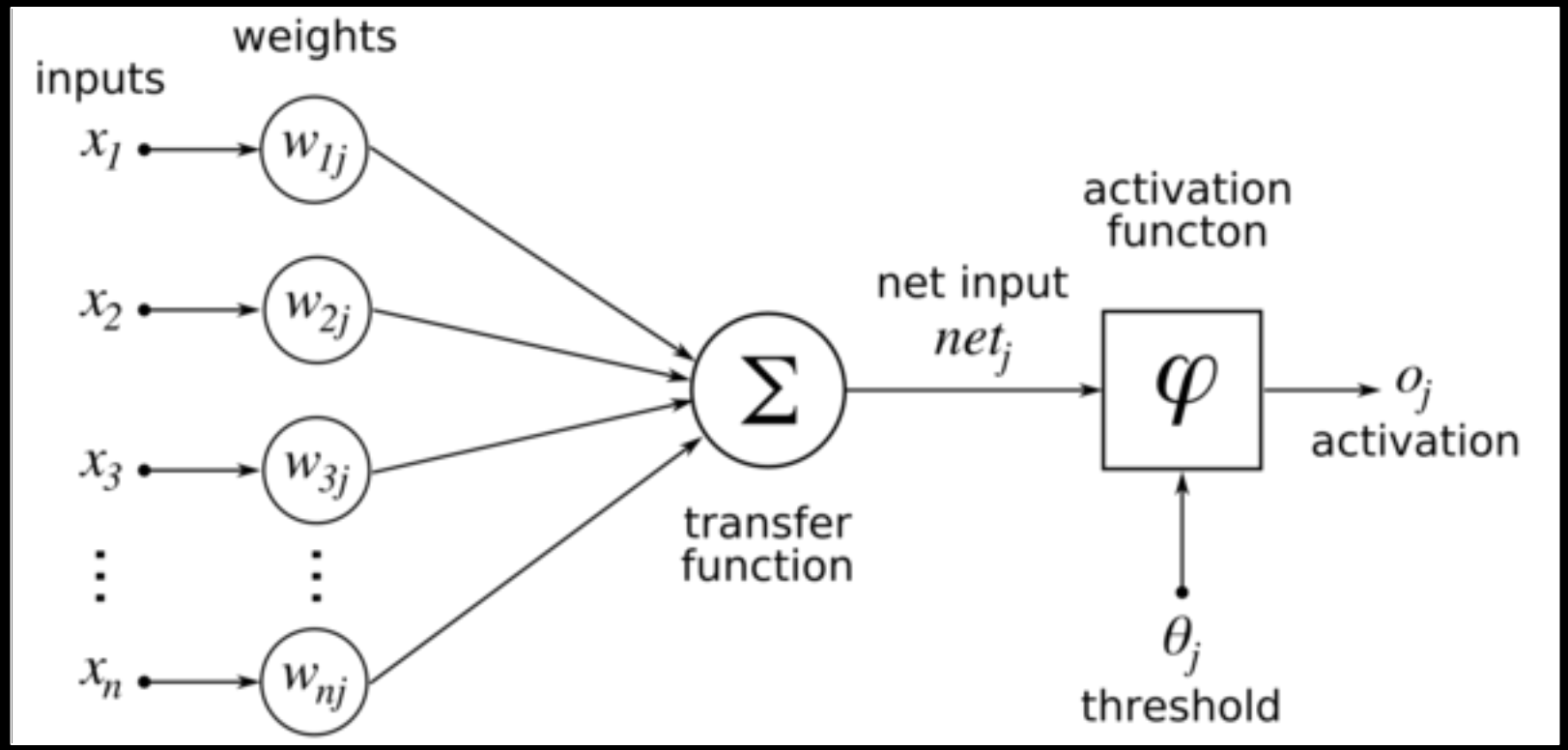


Would be considered

Two Views of Data



Linear Architecture

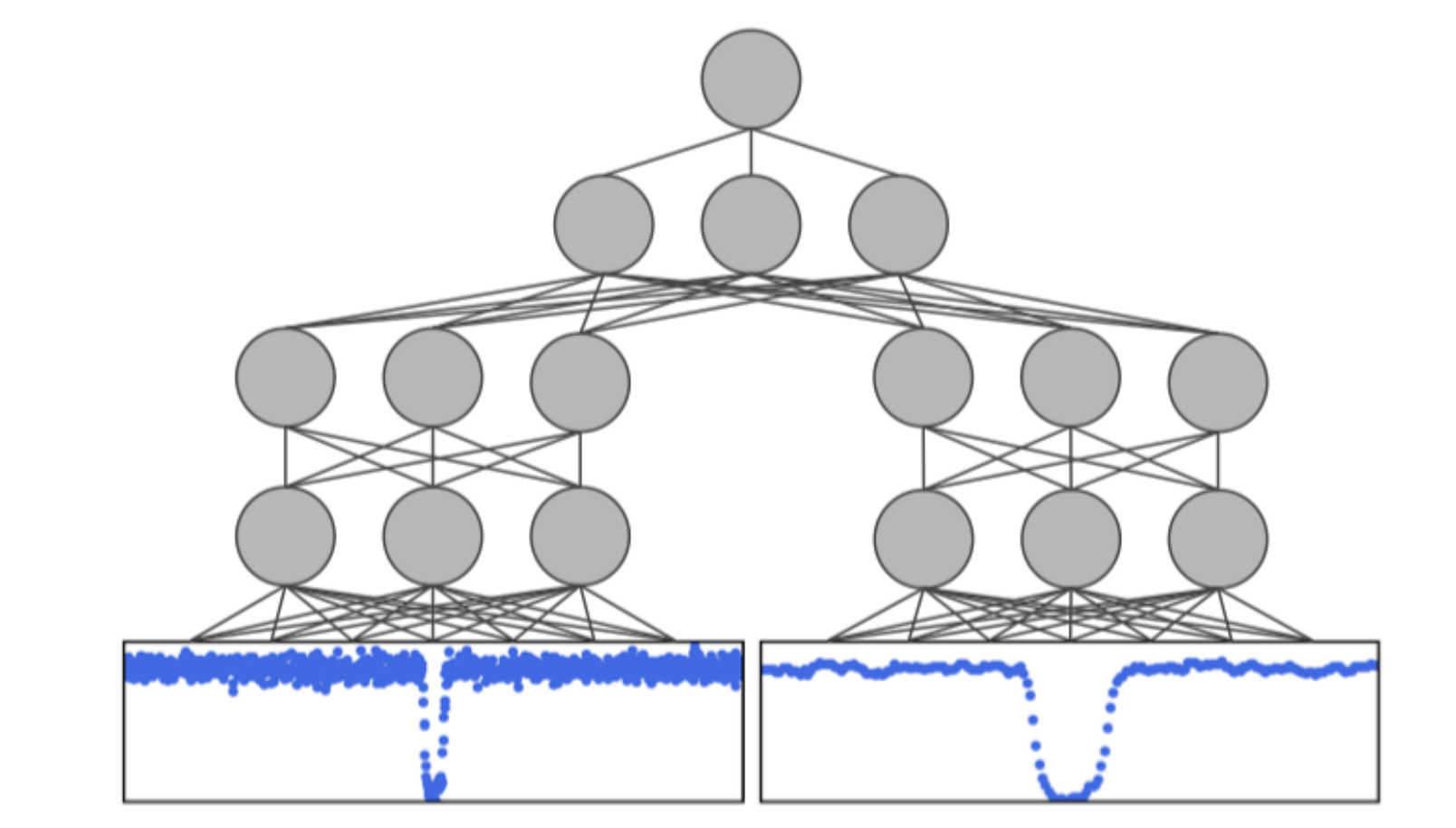


Each Flux Measurement

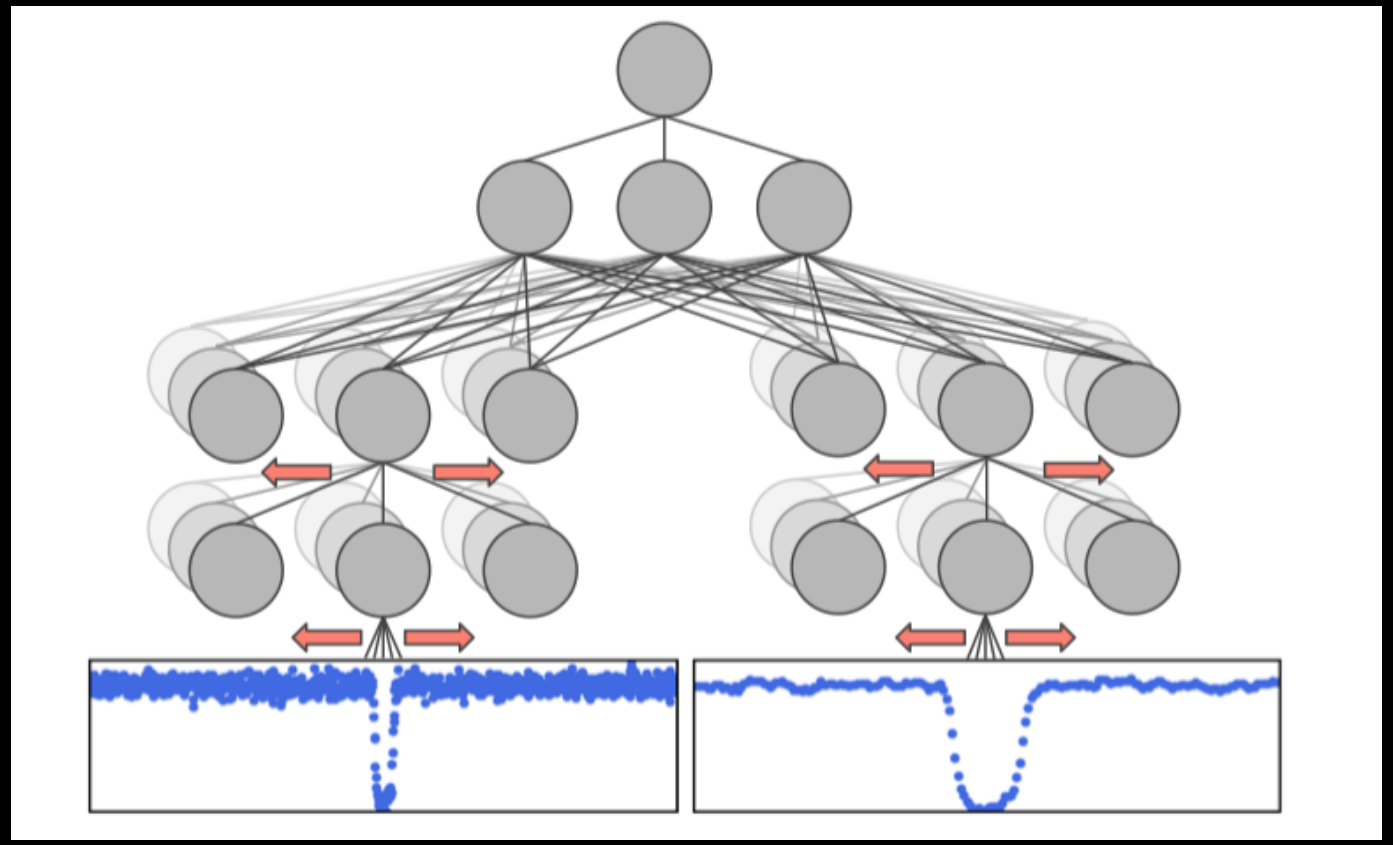
Planet?

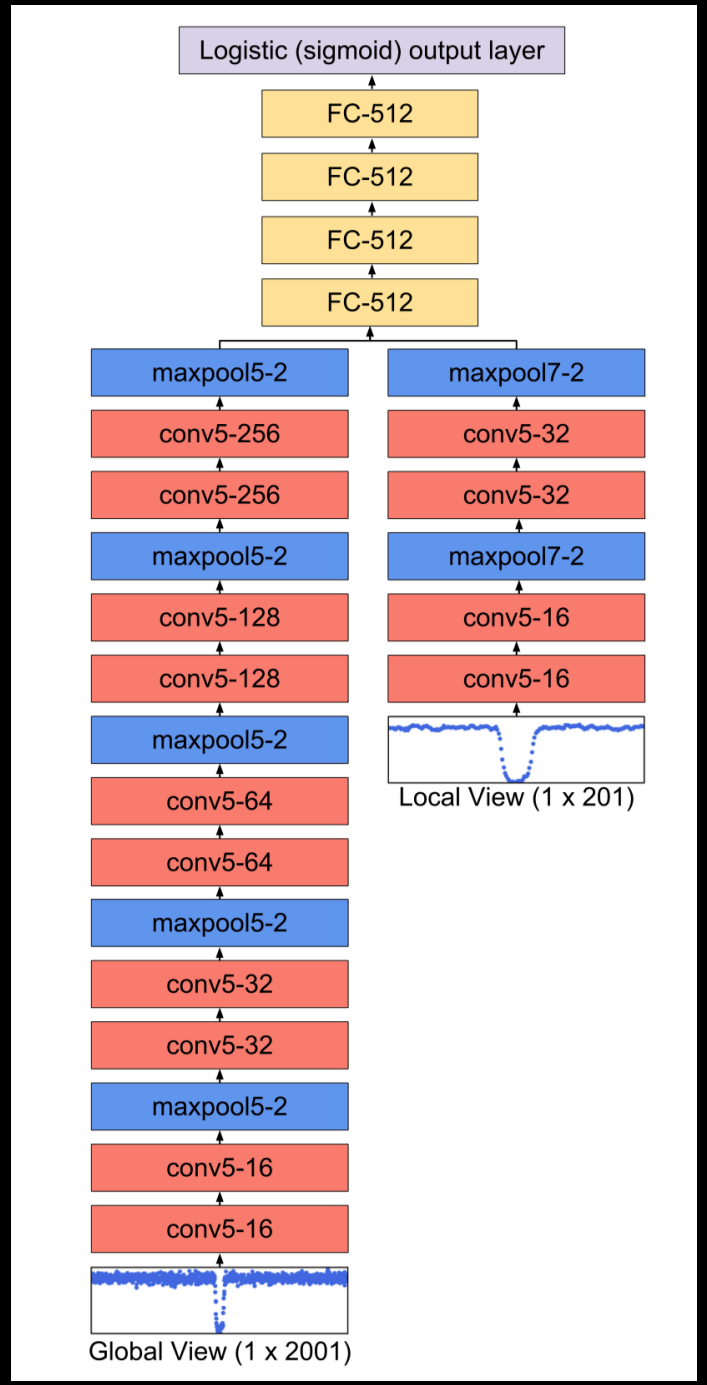
Not Planet?

Fully Connected Neural Network

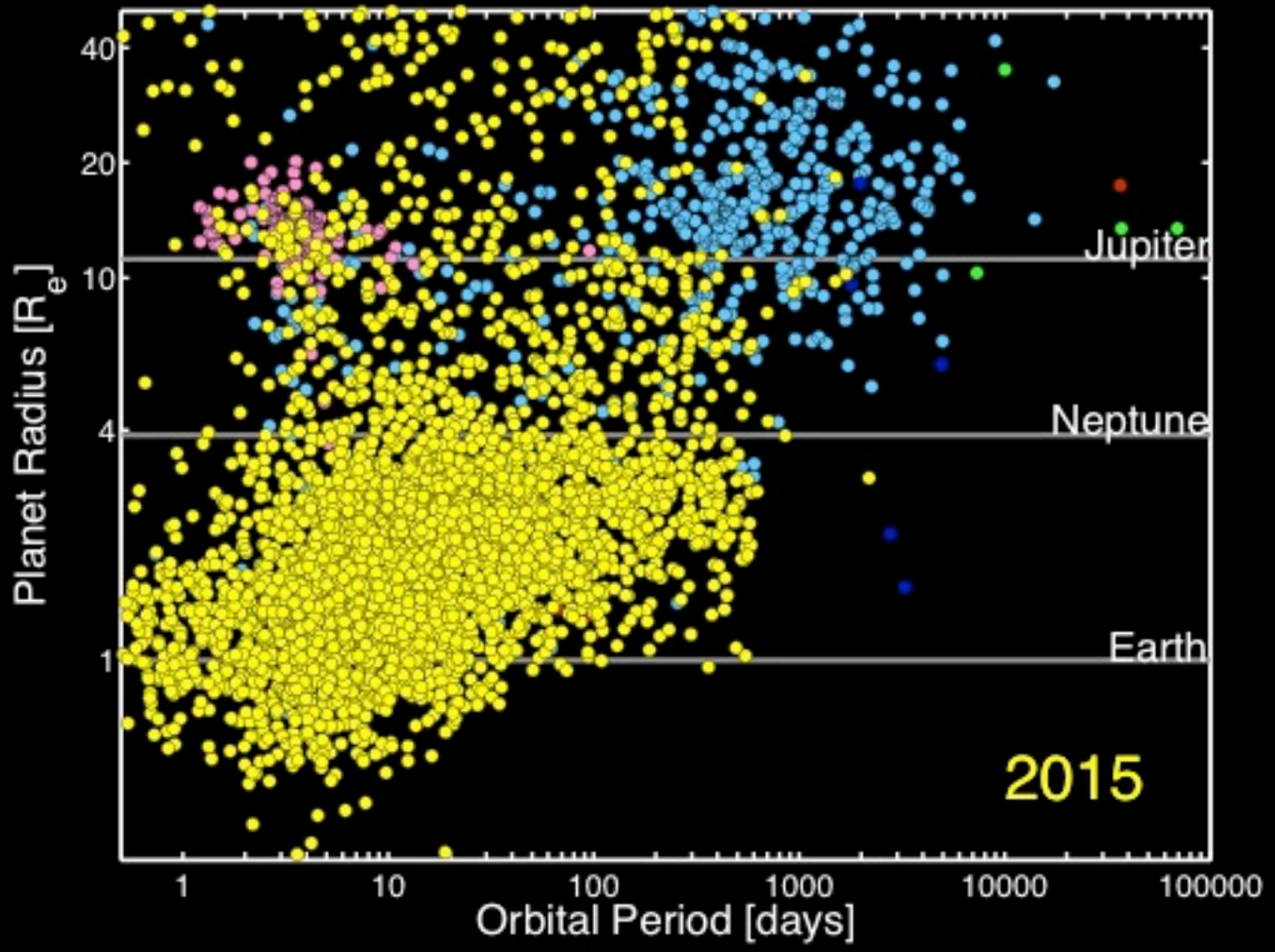


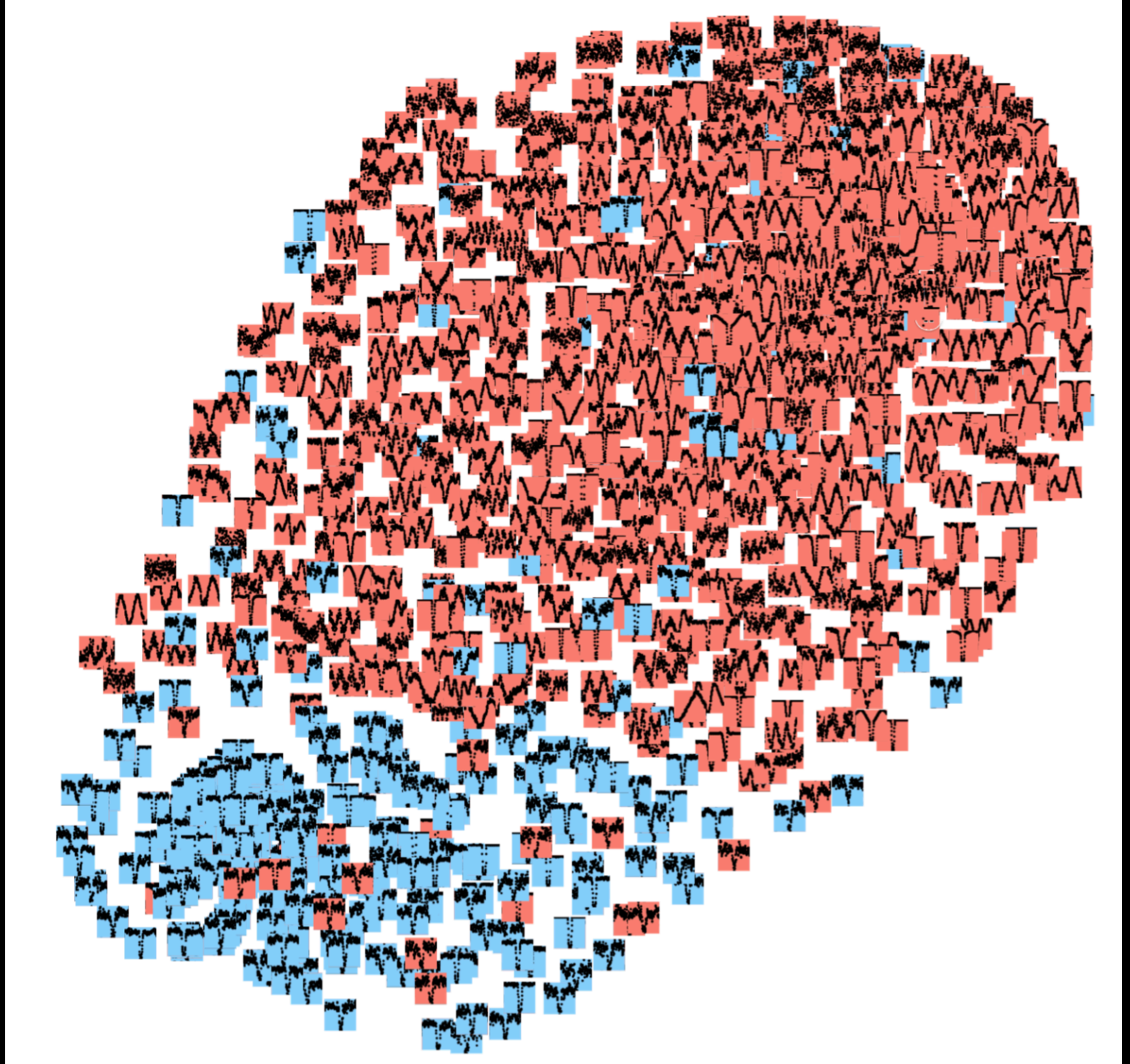
Convolutional Neural Network



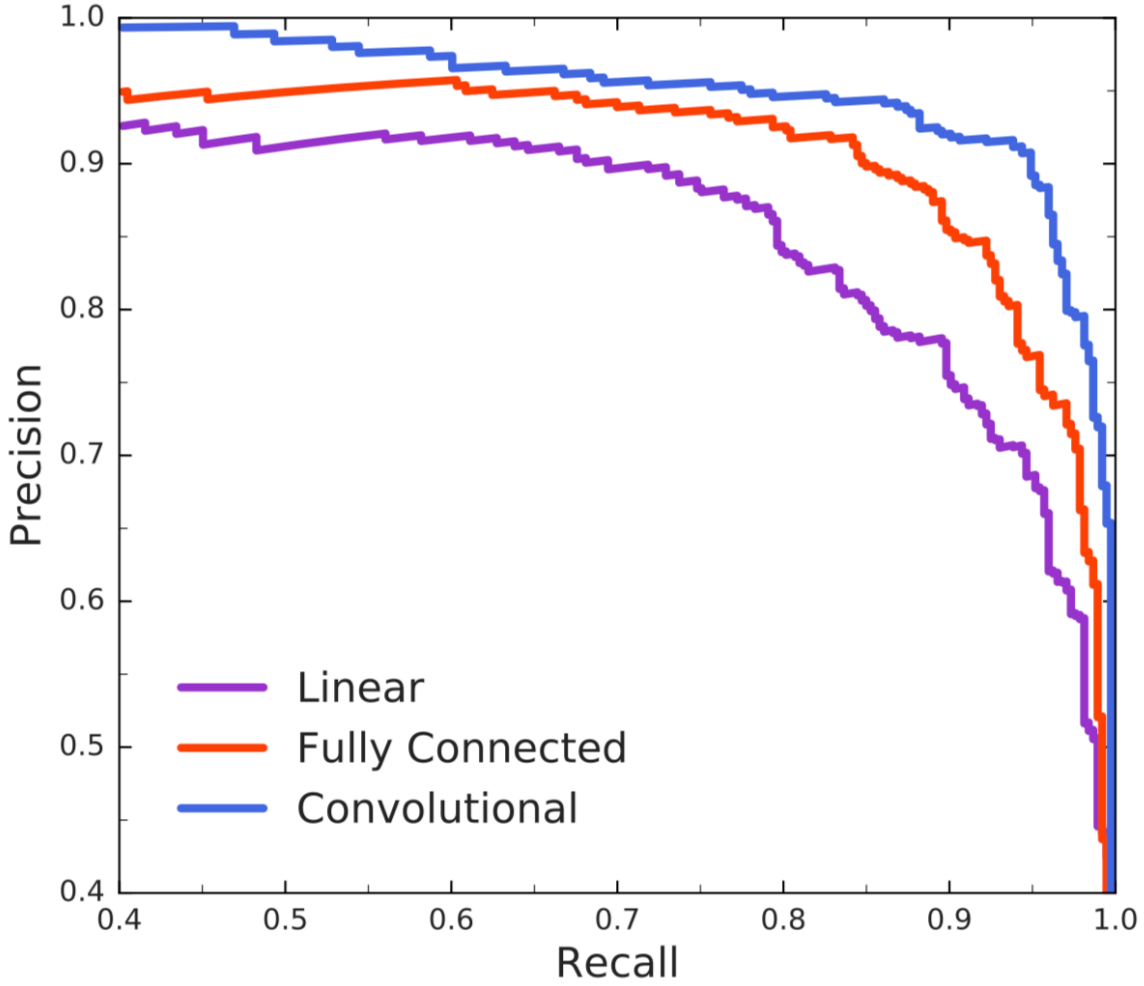


Training set





How well do they work?

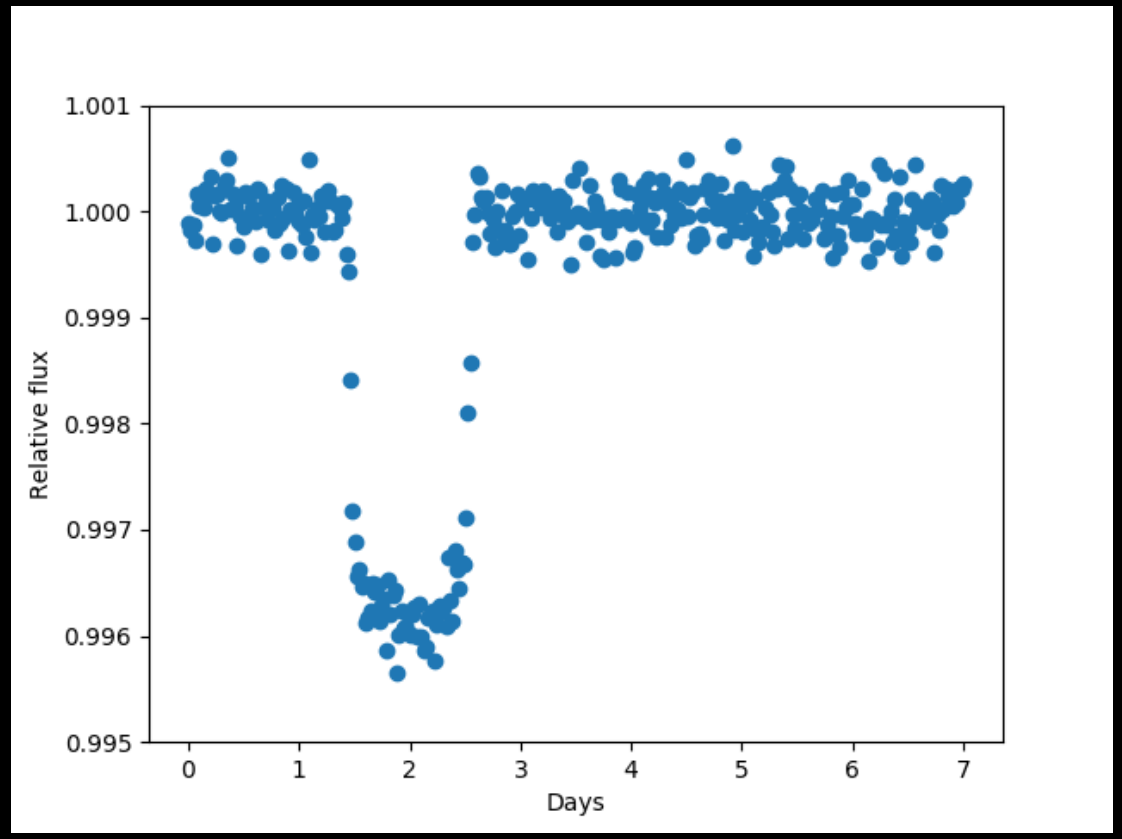


	Global	Local	Global & Local
Linear	0.869	0.879	0.917
Fully Connected	0.902	0.912	0.941
Convolutional	0.954	0.924	0.960

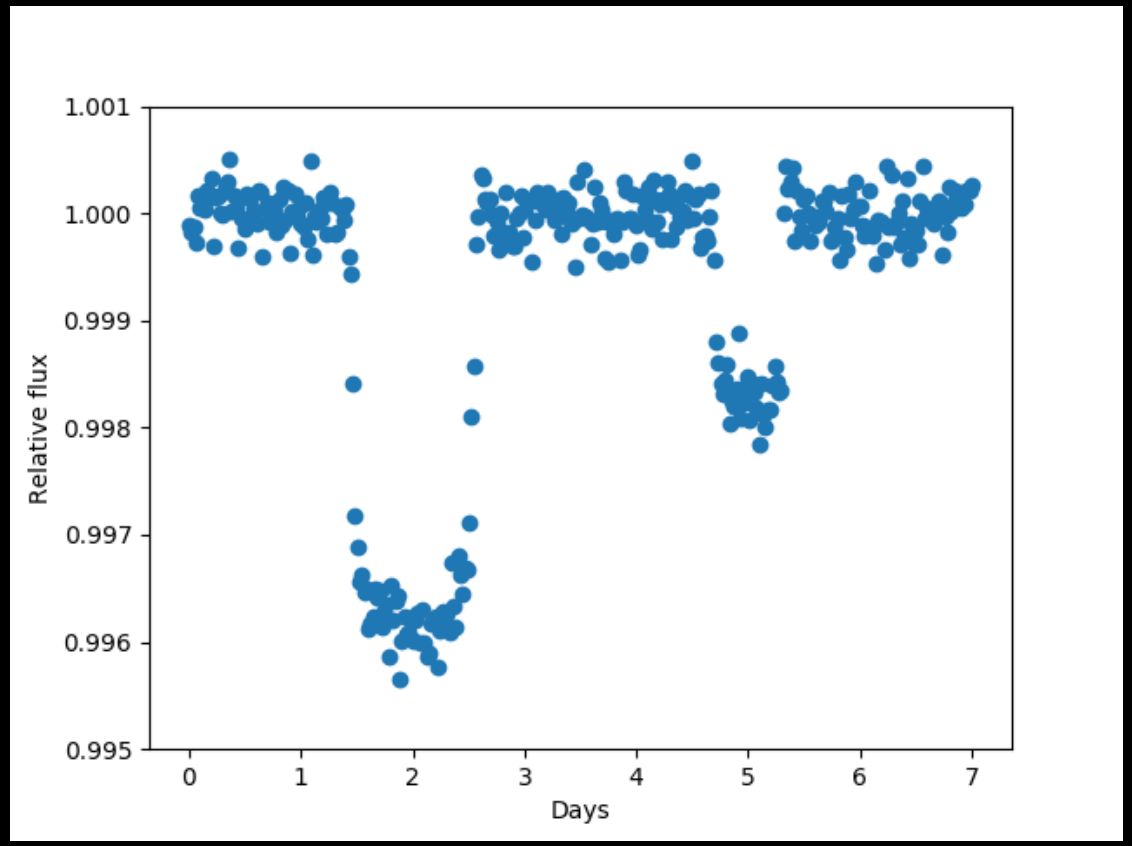
Threshold Increased --->

Using Simulated Data to Test

Before Injection

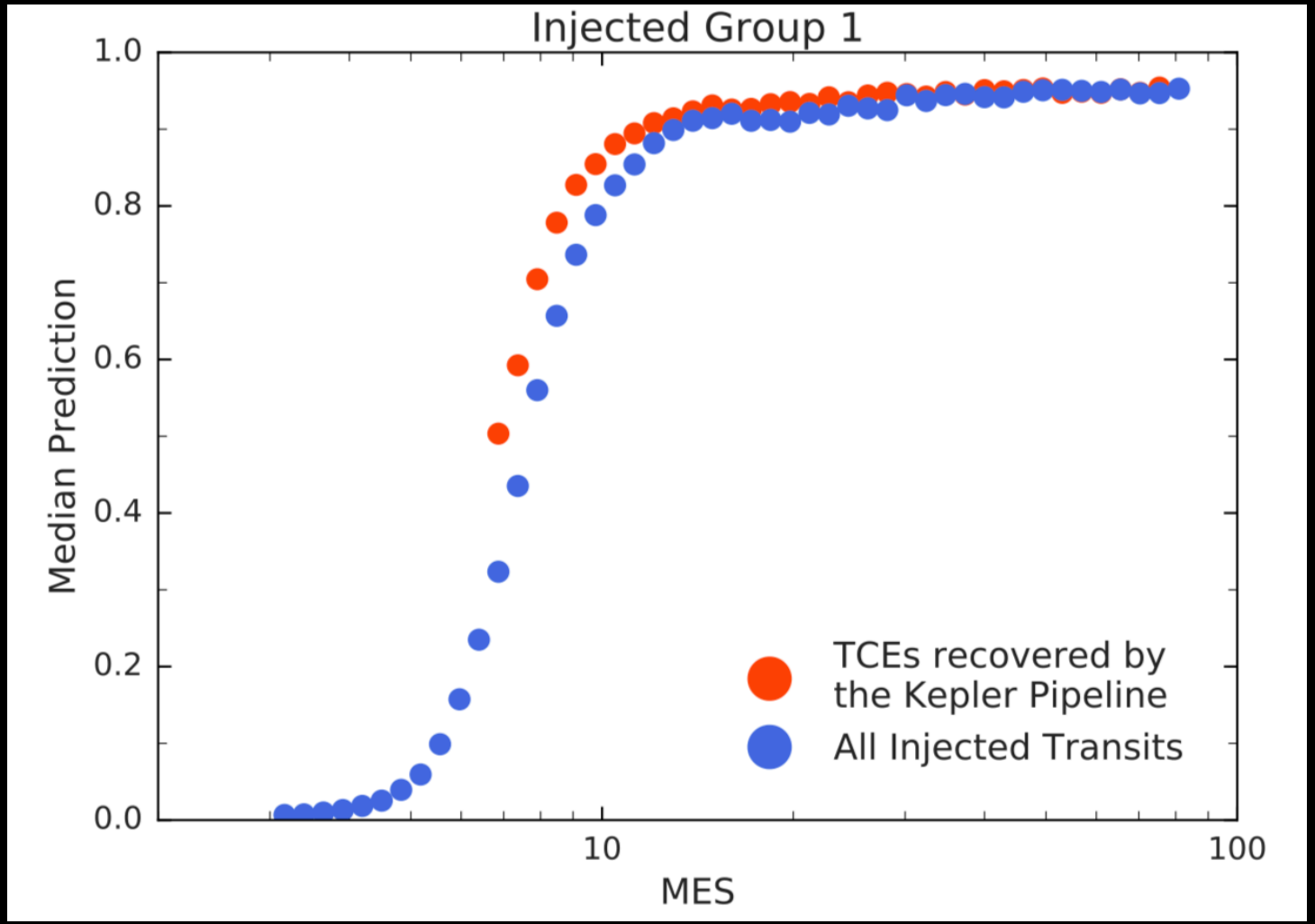


After Injection



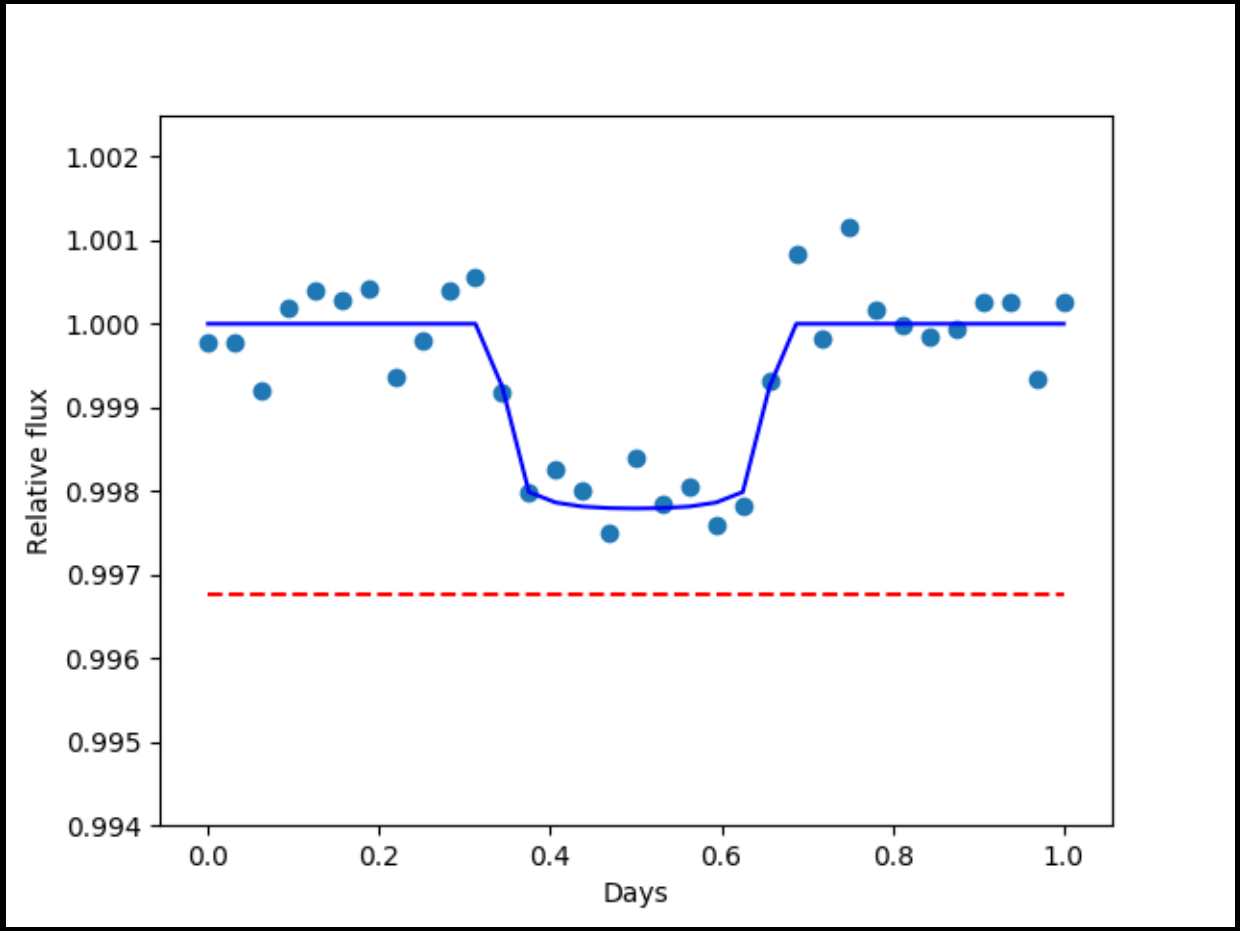
(Christiansen et al. 2016)

Using Simulated Data to Test

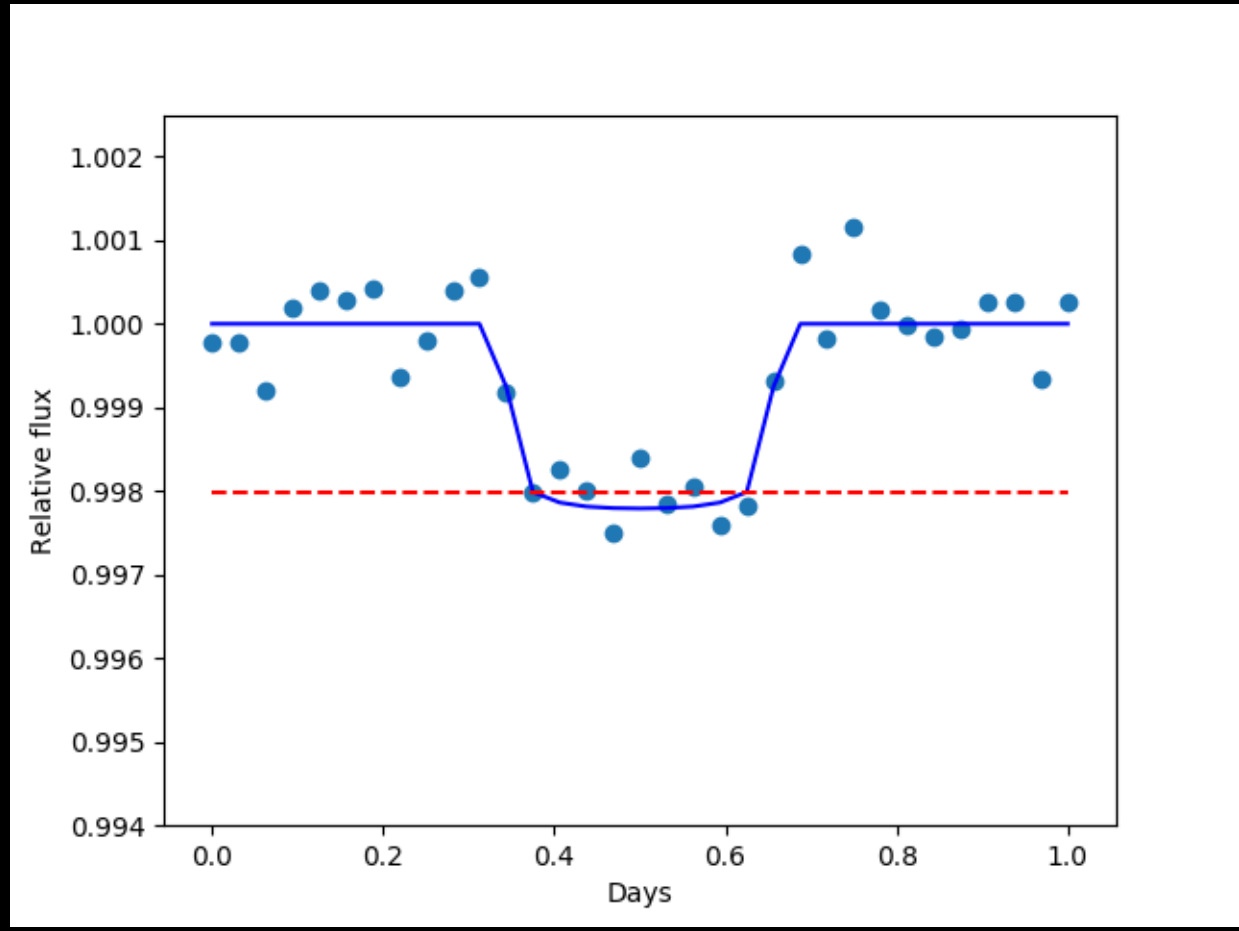


(Christiansen et al. 2016)

Lower the TCE Bar

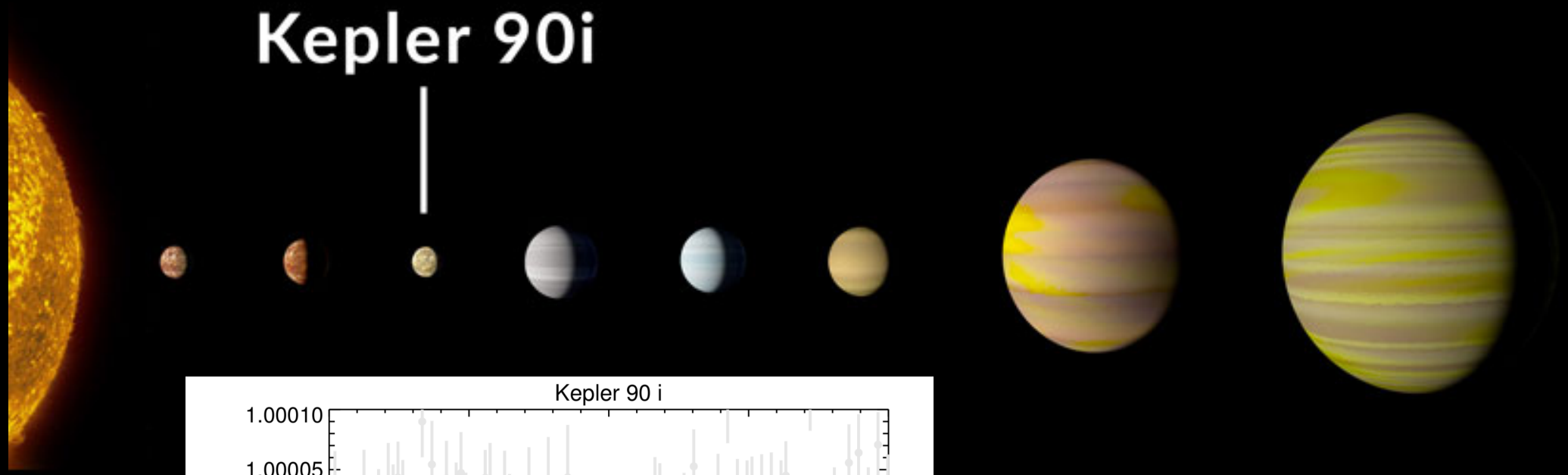


Wouldn’t be considered



Would be considered

News of Eight!



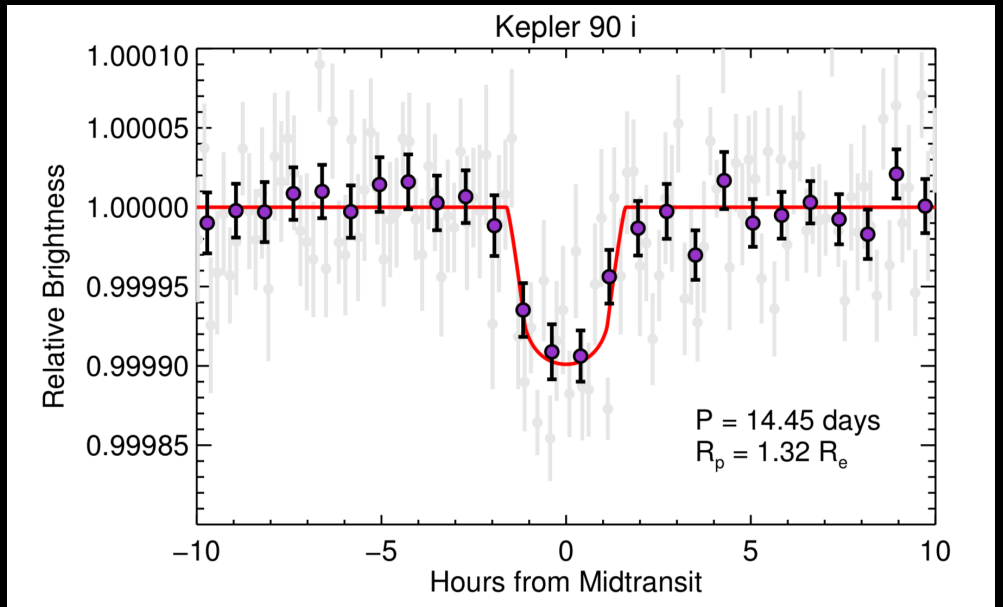


Image Credit: WENDY STENZEL