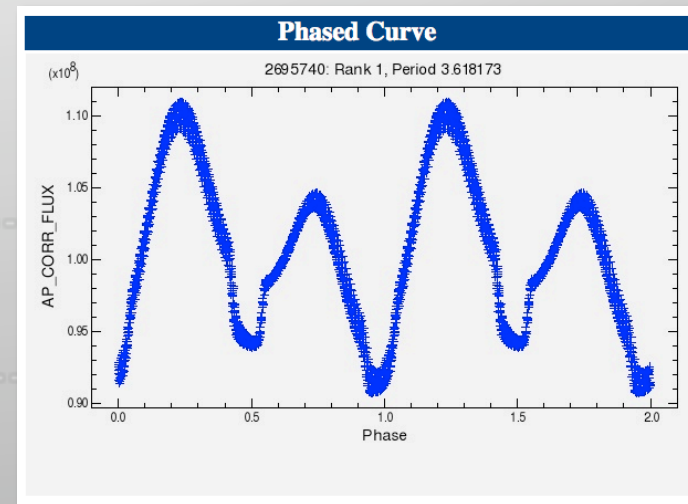


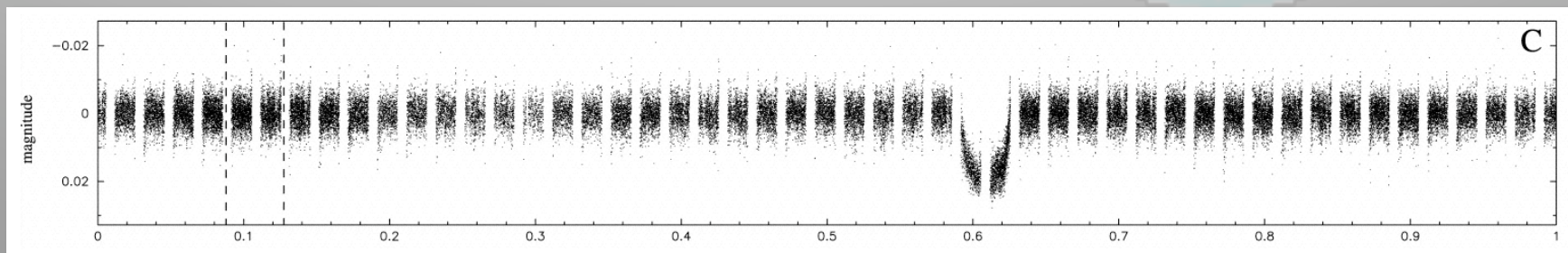
Measuring Eclipsing Binary Star Parameters from Kepler Data

- Binary stars are
 - ubiquitous: only ~50% of systems are single
 - important for determining stellar parameters (M, R, distances... etc.)
- Planet transits are 'special cases':
 - $q \ll 1$, $T_{\text{planet}} \ll T_{\text{star}} \dots$

Eclipsing Binary (Kepler)



Planet



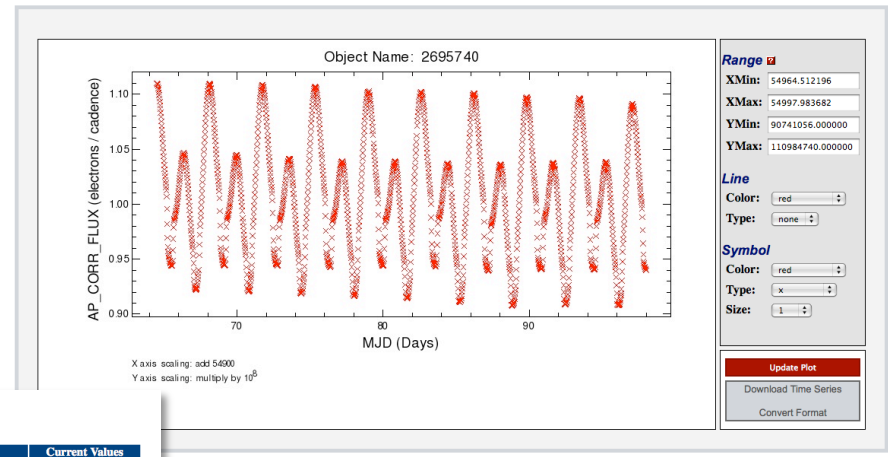
HD 209458, Rowe et. al 2006

- Learn about:
 - What types of light curves come from what kind of binaries
 - What properties can be determined from LCs
 - How those properties are related to LCs
 - How well properties can be determined, what kind of degeneracies/ambiguities are present
 - Anything unusual or interesting you might find....

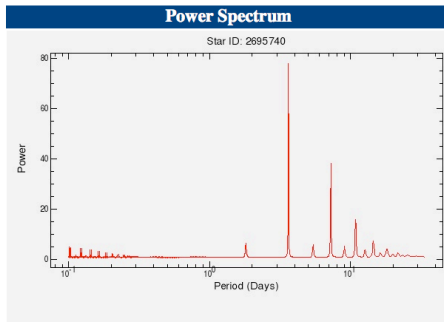
The Project:

- Start with newly published Kepler binary list (Prša et. al 2010), and...
- ...Use NStED/periodogram service....

NStED Light Curve Viewer



NStED Periodogram Service



Rank	Period	Power	P-value	Link
1	3.618173	77.966230	0	Phased curve
2	7.224777	38.293738	0	Phased curve
3	10.819867	16.026100	0	Phased curve
4	1.804526	6.432407	0	Phased curve
5	5.422918	5.817246	0	Phased curve

The P-values above are computed for 16260 periods sampled, and a log-normal power distribution is assumed. The mean log power for this set of periods is 0.0211 and the standard deviation is 0.1685. Note that the estimates of significance (p-value) are not reliable for a small number of periods sampled, or a small period range.

Input		Current Values
Periodogram type	<input type="radio"/> Lomb-Scargle <input type="radio"/> BLS <input type="radio"/> Plavchan	Plavchan
Input file	kplr002695740-2009166043257_llc_lc.tbl Number of points: 1639	View Time Series
Time column	MJD Min: 54964.5122, Max: 54997.9837	MJD
Data column	AP_CORR_FLUX Min: 90741056.0000, Max: 110984740.0000	AP_CORR_FLUX
Constraint column	None	none

Adjustable Periodogram Parameters

The estimated time for processing is 15s

Period Sampling		
Period range	Min: 0.100000 Max: 33.471486	0.100000 33.471486
Period step method	Fixed df	FixedDF
Fixed step size	0.00061320	0.00061320

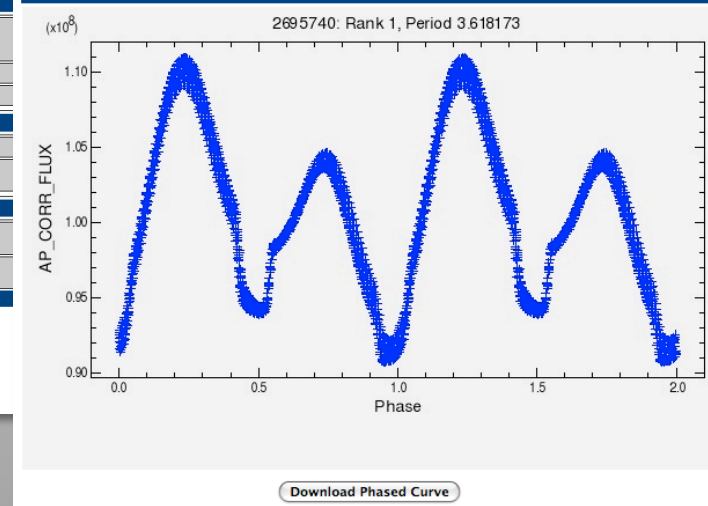
Algorithm Settings		
Number of outliers	500	500
Phase-smoothing box size	0.060	0.060

Output Options		
Number of peaks to return	50	50
Peak significance threshold (P-Value)	1	1

Submit

.... Make folded light curves....

Phased Curve



The Project:

... Model with 'Binary Maker' software.

- Investigate effects of different parameters on light curve models
- Finish with short group presentation on Friday

'Binary Maker'

