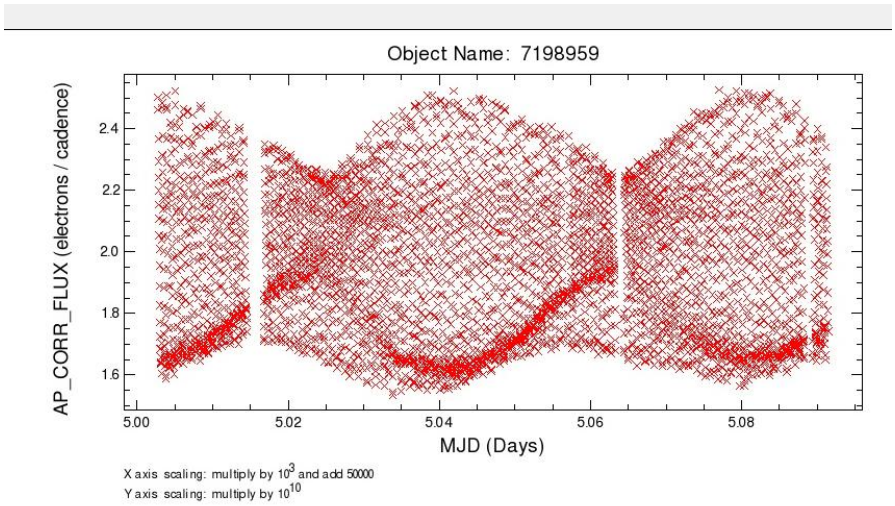
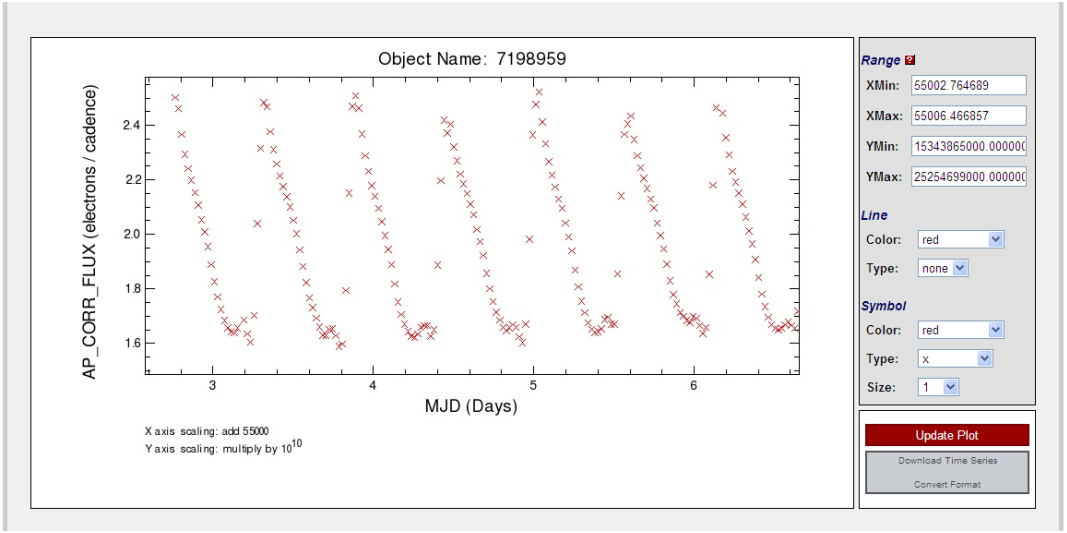
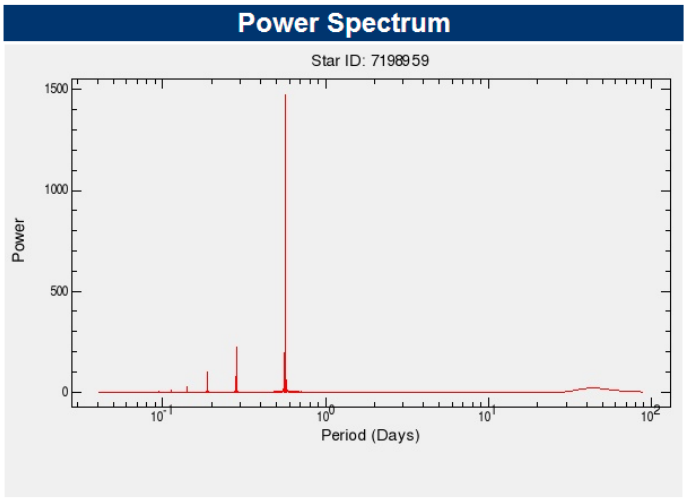
STAR ID: 7198959



Initial time series light curve for the period JD 55002.764689 to 55091.466857. Note the seemingly periodic structures that are visible here. Without further investigation, we are left with not a whole lot! So, let's look at a considerably smaller range of data (time-wise) below, a plot of the time series light curve between 55002 to 55006, just 4 day's worth of data:



It now certainly looks as if this star is variable and pulsating in some regular manner. The power spectrum will help us determine just how periodic and stable this is. Just looking at the above, you could speculate that at least one periodic feature of this star's variability is on a time scale less than one day…. There are seven peaks here for the 4 days. Simple math can give an ***estimated*** rough period of 4/7 = 0.57 day period. Now, let's get more specific and see if we are correct, and plot the power spectrum of the star:

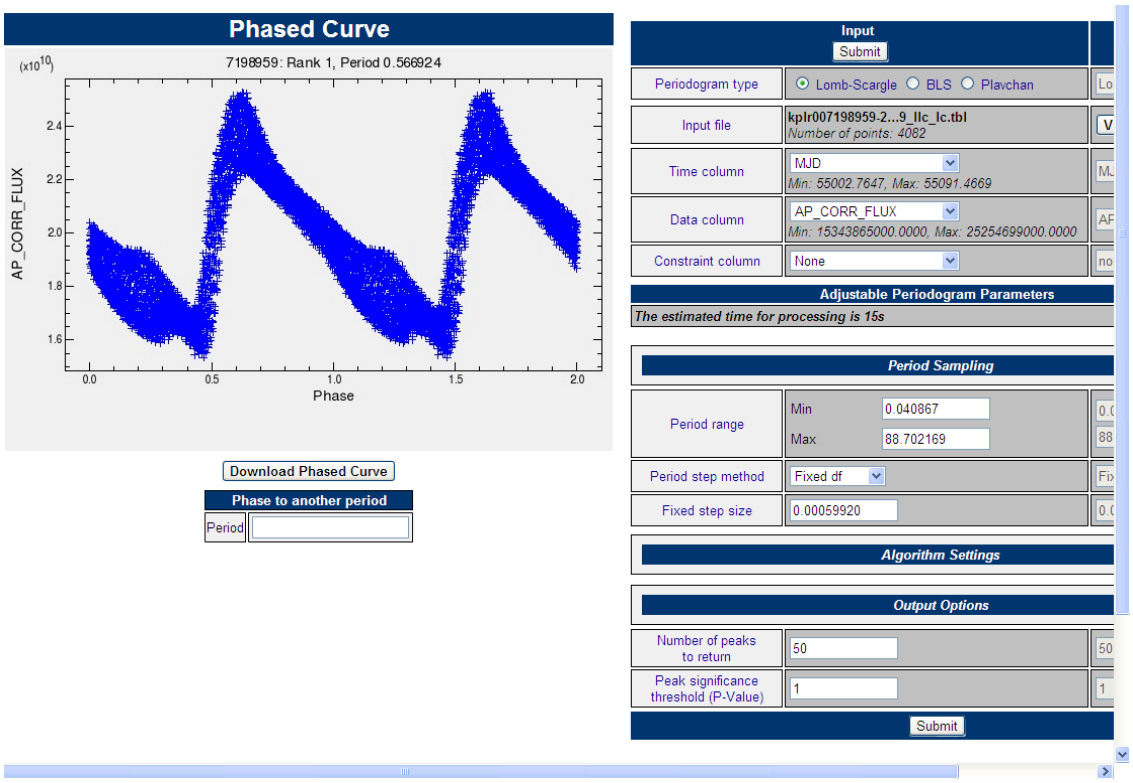


Download Periodogram (ASCII)

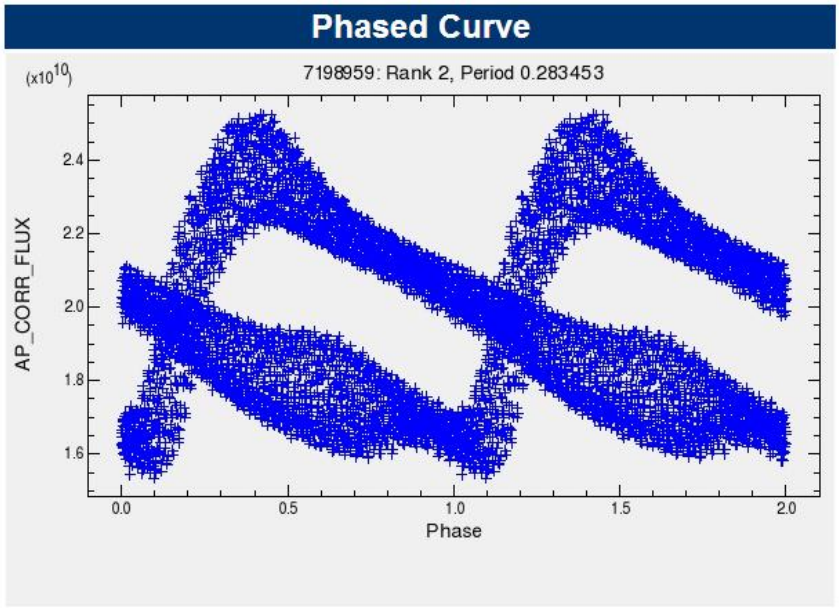
Rank	Period	Power	P-value	Link
1	0.566924	1476.695221	0	Phased curve
2	0.283453	220.655637	0	Phased curve
3	0.188967	100.912407	0	Phased curve
4	0.571976	62.752576	0	Phased curve
5	0.188009	35.932075	9.06386e-12	Phased curve
6	0.141724	25.563791	3.22596e-07	Phased curve

*The P-values above are computed for **40820** periods sampled, and an exponential power distribution is assumed.*

Well, look at that! There is a really strong (high power) periodicity found at 0.566924 day, which is VERY close to our rough estimate at 0.57day. Not too shabby. What happens if we tell the software to plot a phased light curve of this object using that period:



We get a VERY nice looking light curve, indeed. Here we see the data are nicely overlapped and show a remarkable and consistent pattern of periodicity. What about the second most powerful spike in the power spectrum? Will that result in any new indications?



Nope – all we get is, well, a mess. This is simply not a valid solution to the star's periodic nature. There is no way the star could have two magnitudes (flux levels in this case) at the same time! ;-) The first solution was the best.

Steve goes on to say that we have a light curve of an RR Lyrae (RR LYR) type star here, and that is indeed the case. RR Lyr stars are named after their prototype star, RR Lyrae. These stars are all pulsators that no longer reside on the Main Sequence of the HR Diagram. On the HR Diagram these stars reside on the Horizontal Branch: stars like our Sun will eventually expand into red giants as they experience hydrogen shell fusion. This process dumps a lot of helium into the core as waste product, or "ash" as astronomers say. This helium ash continues to heat up and becomes denser until it flashes in a burst of nuclear fusion activity in the core. Once that process settles down a little, the star swings towards being a little smaller and hotter on the surface becoming a horizontal branch star.

Homework: Find out why these stars are so important for astronomers to find and study. They have been really helpful in the past, and continue to act as a standard for astronomers. What is going on here? Why are RR LYR stars important?