

VARIABLE STARS ALIVE AT BEREA COLLEGE

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INTRODUCTION

During the summer of 2008, the Berea College Observatory held host to research of some variable stars which included RR Lyra and AF Cyg. This research proved very useful and data obtained corresponded with previous research and data of these two stars.

The research also included the task of checking the effectiveness of the instruments in the observatory, to study the procedure of finding the clear and detailed image of the target star, to observe the movement of the star over a specified period of the time, to find out the magnitude of the variables such as RR Lyra and AF Cyg, and to study the period of RR Lyra with the help of the light curve.

EQUIPMENT

The Berea College observatory consists of a computer-driven, 16" f/18 Ritchey-Chrétien telescope equipped with a Santa Barbara Instrument Group (SBIG) ST-7 CCD camera and standard UBVRI filters. Attached to the 16" telescope are the 8" and 4" finder scopes. They give less magnified image of the object planet or star, but offer wider field of view than the 16" telescope.

Significant renovations which were undertaken in 2006 include the installation of new stepper motors and a goto computer system provided by DFM Engineering.



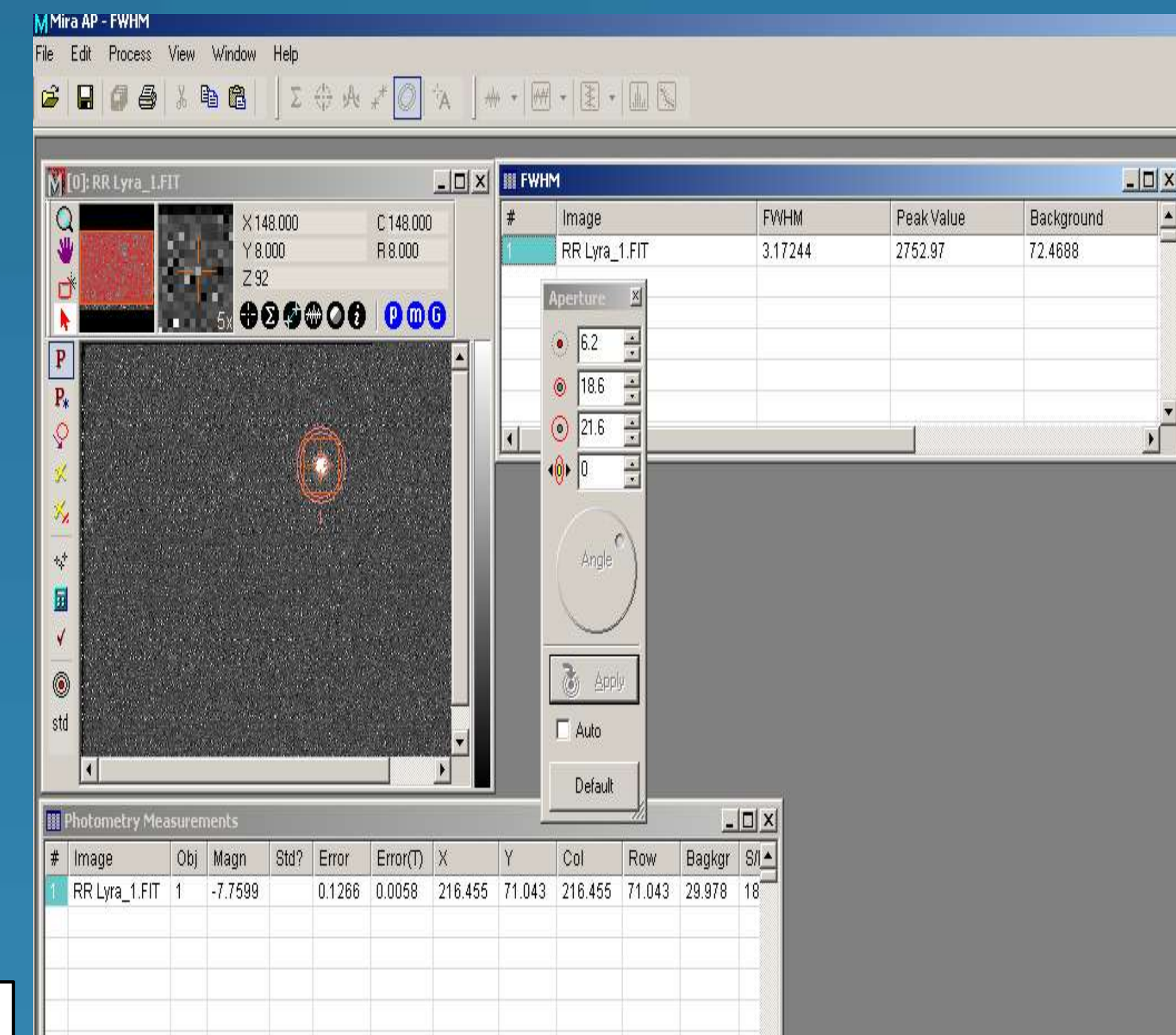
Magnitude of a Star (m) = $-2.5 \log(I)$

Initial Star Image – Dark Frame (At the same time)

For any star image: -----

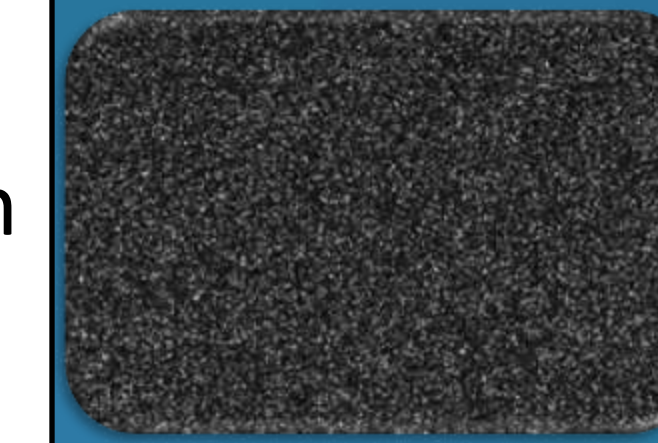
Master Flat

Further image reduction was done using Mira software to get the magnitude of the image of the star.



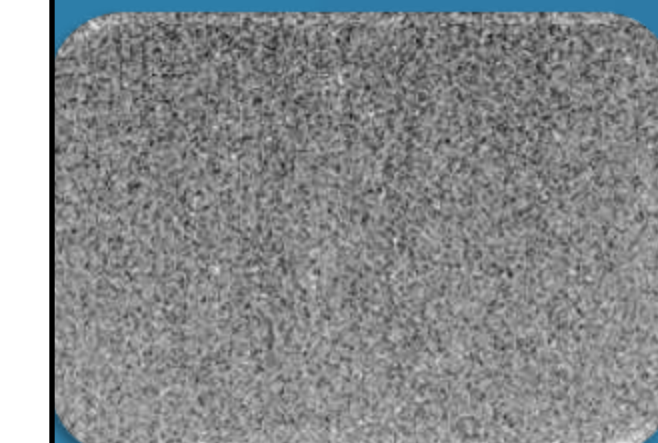
FLAT FIELDS-

- Median of the sky frames.
- Corrects the irregularities in the optical system.
- Divides out the non-uniformity of the sky.



DARK FRAMES-

- Measures the electronic noise in the camera that needs to be subtracted out.
- Taken with shutter closed.



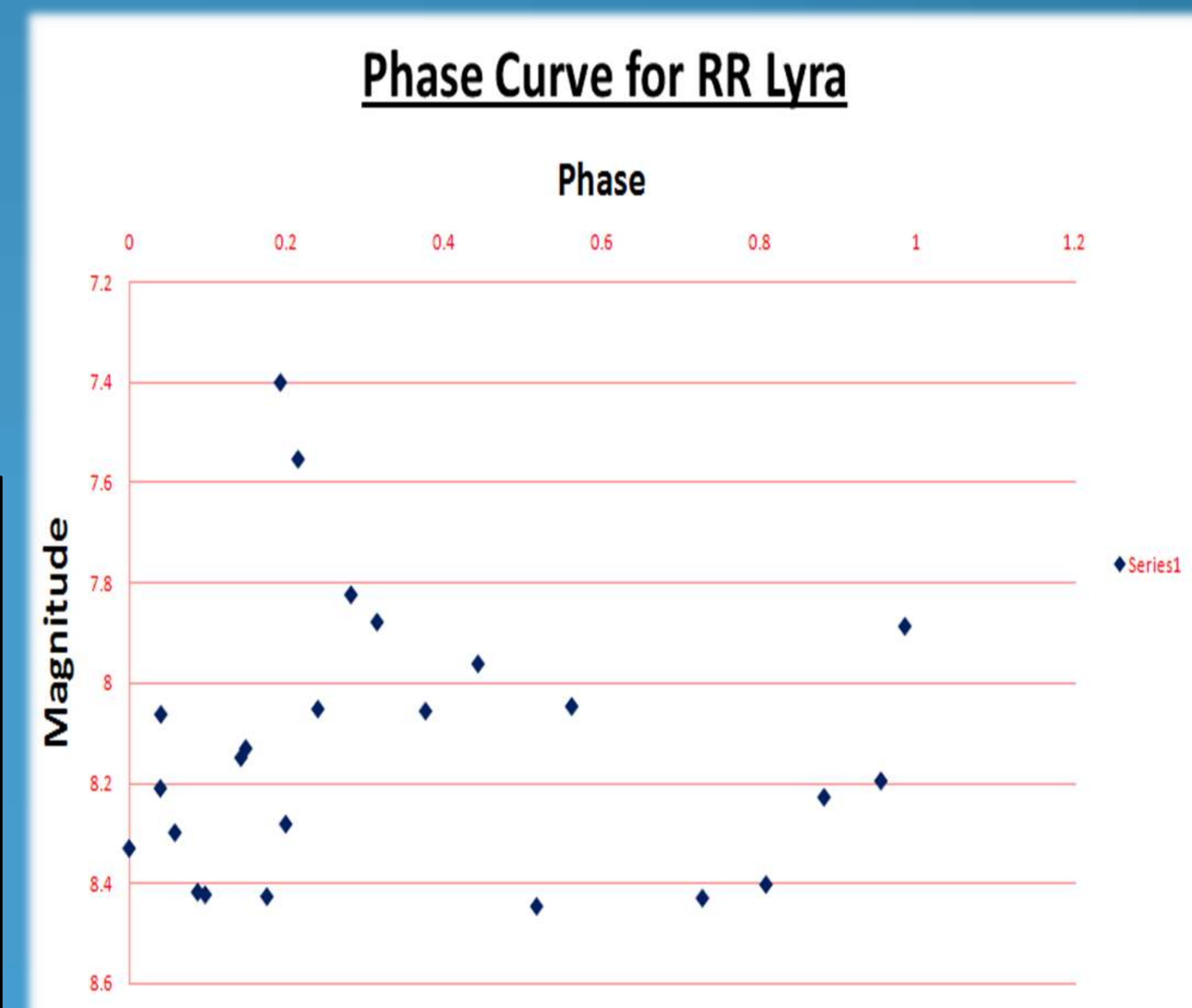
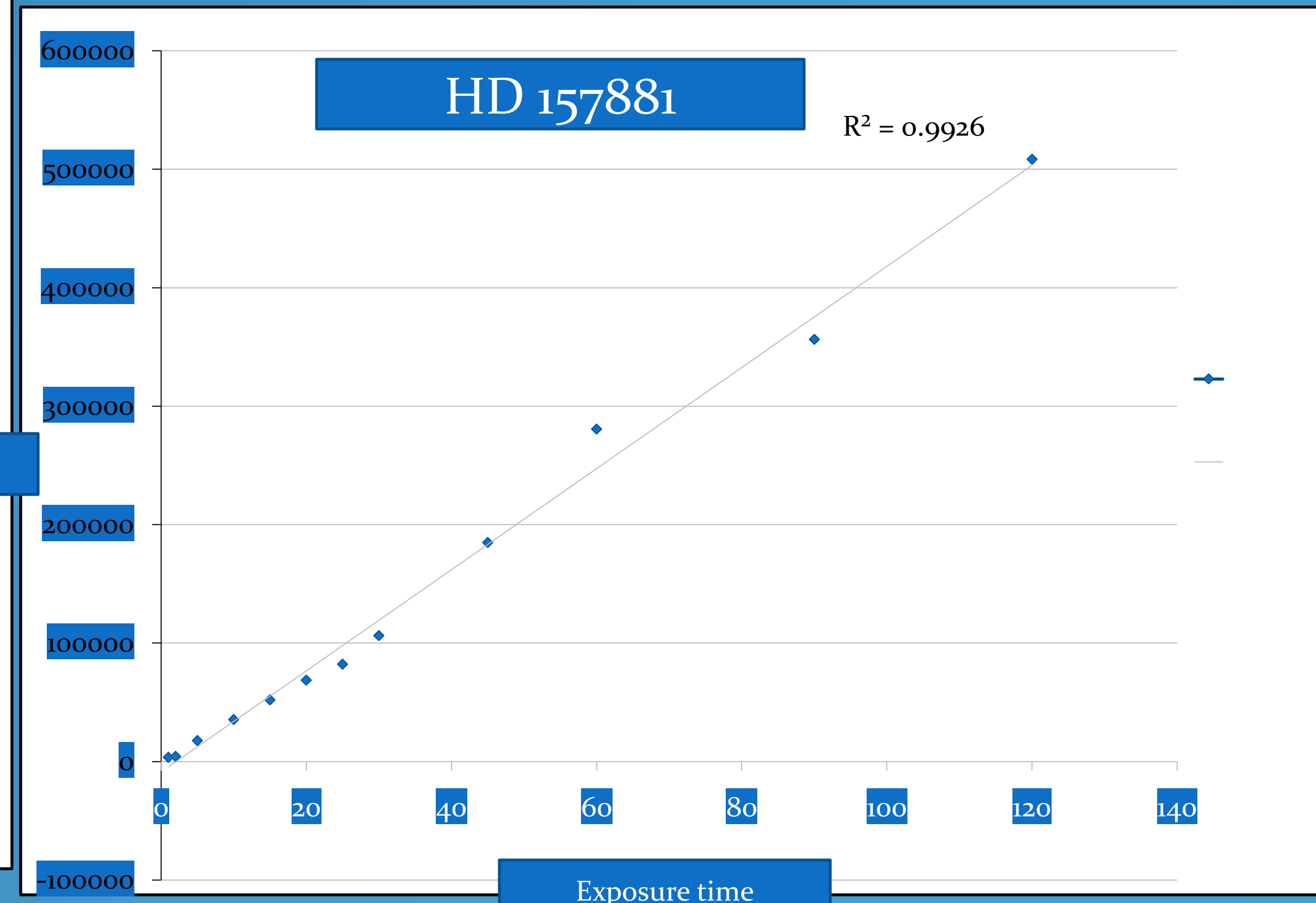
CONCLUSIONS

Last summer proved to be very difficult for research due to the instruments, but this year we were able to use them a lot more efficiently. There was also enough time that we could collect detailed information on the variable stars.

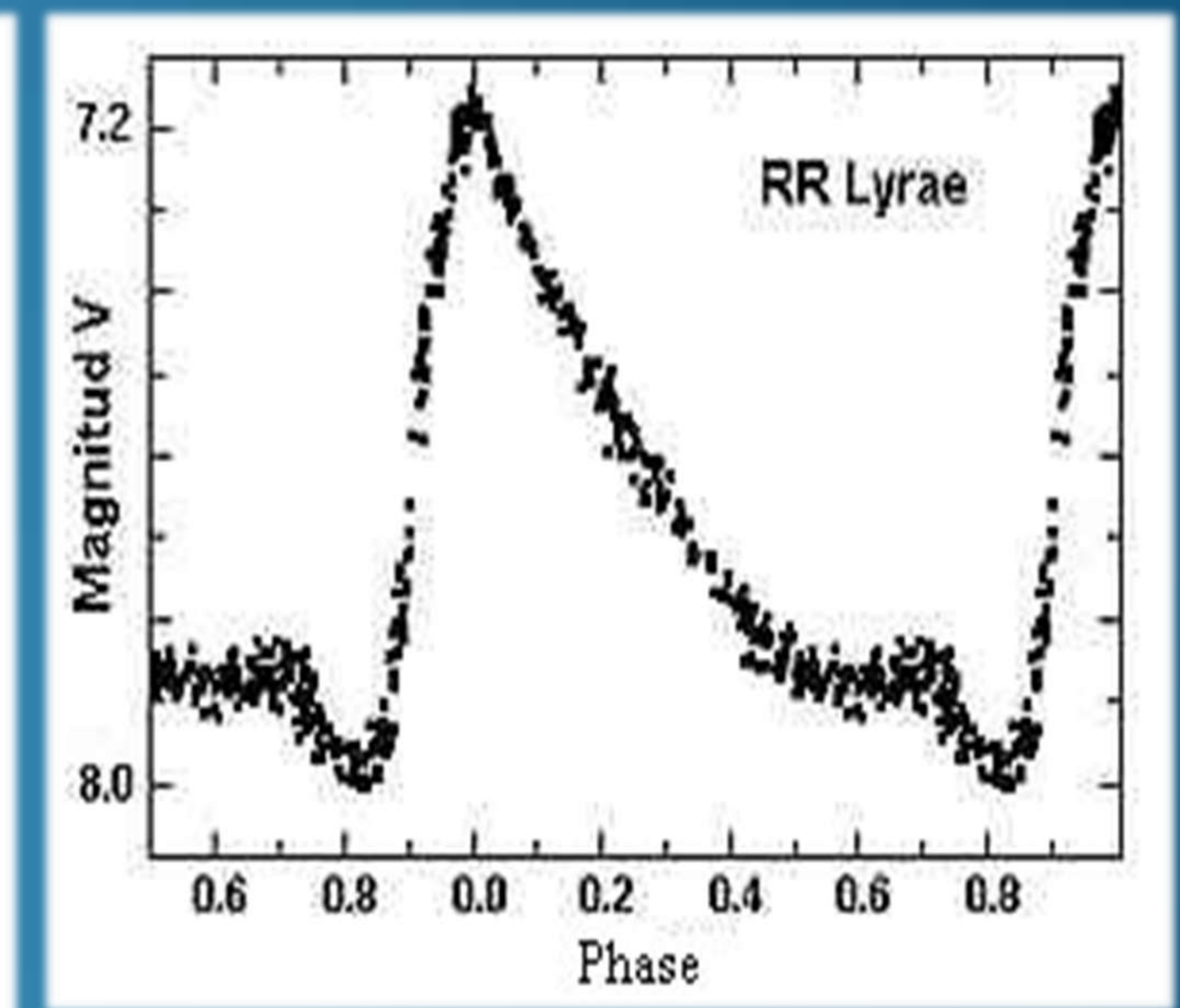
The data we obtained from RR Lyra seems to compare very nicely with the data from extensive research on this subject. Our graph of the light curve comes as expected and therefore proves our data and methods correct.

With our research proving very successful, we opened up furthermore research on these variable stars and made it easier to collect and analysis the data future researchers receive.

Below we have a light curve of HD 157881. We used our computer system, MIRA, to calculate the counts versus the exposure time and came out with a great graph. This graph shows us that the longer we view the star, exposure time or integration time, the more pixels we receive.



Our data



Previous scientific research