Spectral Variations of Several RV Tauri Type Stars

Patrick Durant¹, S.B. Howell², J. Cash¹ and D.K. Walter¹

¹South Carolina State University, ²National Optical Astronomy Observatory

ABSTRACT
We have examined the spectra of several RV Tauri type stars including AC Her, SX Her and V Vul. As is typical of this variable type, the stars show changes in spectral type and line strength in addition to changes in their light curve over time. Our group has acquired spectra of these stars during the past 10 years using the coude feed telescope at Kitt Peak National Observatory (KPNO). The set of spectra were examined to determine their effective temperature and other physical properties as a function of time. We present our results which include the run of temperature and luminosity variations vs. the star’s photometric behavior. Changes in other physical parameters as a function of phase are also discussed.

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RV TAURI STARS
- Pulsating variables with alternating deep and shallow minima. See Nesmith & Cash (adjacent poster, this conference) for examples of the light curves.
- Typical periods between successive deep minima are 30 to 150 days.
- Yellow supergiants which vary in spectral type from F to G at maximum through K to M at minimum light.
- Their evolutionary history is uncertain, but they occupy the HR instability strip between the Cepheids and Miras.

ANALYSIS
- We have acquired high signal to noise spectra of these objects already in our database as well as other RV Tauri and Semi-Regular variables.
- Using the results of Nesmith and Cash (adjacent poster, this conference), we will identify the specific future Julian dates corresponding to data gaps in phase space and obtain spectra on those dates.
- Future work will include error analysis of observed and derived quantities as well as extinction corrections to our observed magnitudes.

The ultimate goal of our 5-year study is to determine the temporal change of the physical parameters for RV Tauri stars throughout their pulsation cycle in order to better understand the physical nature of these objects.

DISCUSSION

AC Her
- steep rise in T in early phase of cycle
- factor of 3 increase in L in steep rise early in cycle
- data needed in later part of cycle to confirm steep drop to lower values at the beginning of next cycle

SX Her
- nearly constant T over phase
- luminosity variation on the order of 20%
- radius change on the order of 10%

V Vul
- scatter of data makes conclusions uncertain
- rise in T during first half of cycle
- factor of 3 increase in L at beginning of the cycle

FUTURE WORK
We are currently acquiring additional spectra for objects already in our database as well as other RV Tauri and Semi-Regular variables. Using the results of Nesmith and Cash (adjacent poster, this conference), we will identify the specific future Julian dates corresponding to data gaps in phase space and obtain spectra on those dates.

Future work will include error analysis of observed and derived quantities as well as extinction corrections to our observed magnitudes.

REFERENCES
AAVSO data, http://www.aavso.org
Hipparcos/Tycho data, http://simbad.u-strasbg.fr/Simbad

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