FUSE Far Ultraviolet Spectroscopic Explorer

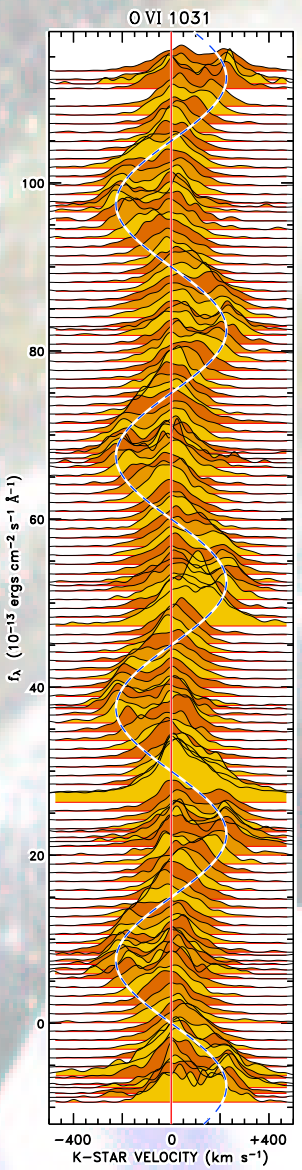
~~Seven~~ Eight Days in the Life of AR Lac

T. Ayres[1], A. Brown[1], G. Harper[1], H. Korhonen[2], S. Red£eld[3], S. Hawley[4], & Optical Support Team

[1]CASA, [2]AIP, [3]U. Texas, [4]U. Washington

Abstract

A week long *FUSE* pointing on short period eclipsing binary AR Lacertae (K0 IV+G4 IV; $P = 2$ d) was coordinated with groundbased Doppler imaging to provide an unprecedented view of structure, energetics, and dynamics of surface activity on a classical RS CVn system.

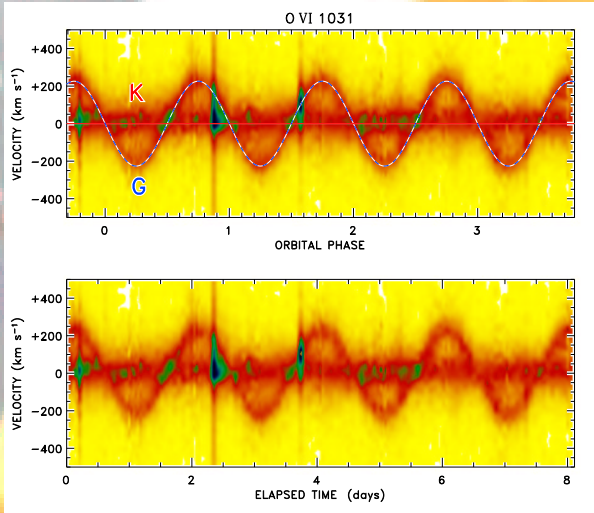


Background

AR Lac is an eclipsing binary of K0 and G4 subgiants, separated (surface to surface) by just under the diameter of the larger cooler primary, in a 1.98 d orbit. The K star is slightly more massive than the warmer less evolved secondary. Primary eclipse (K star in front) is total and lasts for several hours; secondary eclipse is partial. At $d = 42$ pc, AR Lac is one of the brightest coronal stars in the *ROSAT* all sky survey, and a prominent FUV source as well.

Observations

The *FUSE* pointing was carried out 29 November to 7 December 2004, covering four revolutions of the binary. Total exposure was 225 ks. Emissions of O VI λ1031 and C III λ977 are prominent, and detected from both components of the system (more weakly from G star). Figure *left* illustrates the O VI time series (LiF1a channel), in K-star reference frame (dashed curve traces G-star velocity). Supporting Doppler Imaging was carried out at the Nordic Optical Telescope, McDonald Observatory, and Apache Point. (The multi-site campaign was necessary owing to the nearly exactly 2 day period of the system.)



Discussion

Figure *above* depicts O VI time series as an image, again in K star frame. Three large O VI ¤ares are conspicuous, with signi£cantly elevated continuum emission. Numerous smaller events also are apparent. Much—but not all—of the ¤are activity is on the K subgiant primary, and largest outburst ($\phi \sim 0.86$) exhibits strong redshifts. Future analysis will concentrate on ¤are dynamics, association of events with optical starspots, and behavior during eclipses.

Acknowledgment. Supported by *FUSE* GI grant NNG05GD91G.

Tom Ayres
389 UCB (CASA)
University of Colorado
Boulder, CO 80309