

## Spectroscopy of the Proto-Planetary Nebula CRL 618

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We present spectroscopic observations of the protoplanetary nebula CRL 618. The spectra in the range from 370 to 800 nm were taken at the 3.5m telescope on Calar Alto (Spain). The slit of the spectrograph covered both the brighter E-lobe and the fainter W-lobe. Using the balmer line we found an extinction of about  $c = 1.6$  for both lobes. The emission lines show a velocity difference between the two blobs. The difference of the forbidden lines is found to be bigger than the  $v$ -difference of the permitted recombination lines in agreement with Carsenty and Solf (1982). Exceptions are the O II 732.0 nm and 733.0 nm and the N II 575.5 nm lines. It also seems that the spatial separations of the peak emissivities of the forbidden lines are bigger than the separation of the recombination lines. This might be a result of the geometry and structure of the object. The permitted lines are emitted from the central source and reflected towards the observer at the inner edges of the blobs while the forbidden lines are emitted from the lobes themselves. Kelly *et al.* (1992) found a different  $I(\text{N II } 658.4 \text{ nm} + \text{N II } 654.8 \text{ nm})/I(\text{N II } 575.5 \text{ nm})$  ratio for the bright E-lobe than the older observations from Schmidt and Cohen (1981). This indicates an increased temperature of the bright lobe. We found now a similar temperature enhancement for the faint W-lobe. This may be caused by a shock reaching the inner edges of the blobs. This may also be the reason that the N II 575.5 nm line seems to originate at the inner blob edges, showing a smaller spatial separation. There is another indication for an increased temperature, we found some evidence for the S III 631.2 nm, the He II 468.6 nm and the O III 500.7 nm lines. The protoplanetary nebula CRL 618 is one of the few objects in this transition stage where dynamical processes can directly be observed.

### REFERENCES

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