The Optical Jet of R Aquarii
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R Aquarii is a stellar system containing a long-period (386 days) Mira variable of spectral type M7e. The presence of an irregularly variable blue continuum and possibly of a several years modulation in the lightcurve suggests that the Mira has a companion, namely a white dwarf with an accretion disk. The most spectacular feature of this symbiotic system is a bright circumstellar nebula (photographs of which are shown in Sky and Telescope, 64, 141, 1982 by Kaler). This nebula is very likely due to a nova outburst undergone by R Aquarii centuries ago and described in Japanese astronomical records of AD 300 (Kafatos, Michalitsianos, Nature, 258, 540, 1982).

For several years R Aquarii has been known to eject some material as it presents P Cygni type profiles. Besides, an optical protuberance appeared sometime between 1970 and 1977. Photographic plates of 1980 show that it extends to 10 arcsec from the star with two brightness peaks at about 6 and 8 arcsec and that there is a gap between the inner end of the jet and the star (Sopka et al. Ap. J. Lett, 258, L35, 1982). This jet probably corresponds to a collimated ejection of matter from the stellar system. If the observed expansion is due to a real transfer of matter, the jet velocity appears to be ≥ 300 km/s, which is a rather large value. It is therefore possible that we observe in fact the speed of displacement of a zone of gas ionization, the gas itself moving outwards more slowly. Sopka and his collaborators detected this jet in radio wavelengths also.

The Mira variable has been kind enough to be almost at its minimum during my observing run of last November in La Silla. Thus I obtained CCD exposures of different exposure time (30 sec, 1, 2, 5, 10, 20 min) of its system in the B and V Johnson colour bands, in order to study the inner part of the jet, close to the star. Fig. 1 shows a 2-min exposure. The 10 arcsec nodule extended towards a position angle ~ 30° and already seen in...
The 30 sec exposures show that the brightness peak of this second nodule is at about 2 arcsec from the star. It coincides with a new radio spot as indicated by Kafatos et al. (Ap. J. 267, L103, 1983). The integrated luminosities of the 10 and 4 arcsec nodules are roughly 7% and 6% of the luminosity of the star in the V colour band (namely $m_{10}=13.9$ and $m_{4}=14.1$ for $m_{lim}=11$, assuming a linear response of the CCD even at very low and very high fluxes). The simplest interpretation of the 4 arcsec nodule is that it is due to a new ejection of matter which occurred between 1980 and 1982, unless it was not detected on the 1980 plates because of an overexposure of the star. The difference in the position angles of the two nodules expresses that those nodules have been ejected in two independent events or rather that they belong to the same beam curved by some effect as precession of the emitting system.

Due to its relative vicinity (200 parsec), R Aquarii is one of the few objects which could be used to confront directly with the observations the models of ejection of matter along the axis of an accretion disk, since its accretion disk is supposed to have an angular size of the order of 0.1 arcsec and could be resolved by interferometric techniques or by the space telescope. As it seems to be now in an active phase (are we observing a slow nova outburst?) it would be of interest to obtain a few times every year photographic (possibly with a stellar coronograph) and spectroscopic data of the object. The material difficulty to organize such a surveillance of a single object is expressed in the general question of M. Gerbaldi (Messenger of December 1982): how to obtain (officially) occasional observations without applying for several telescope nights?

Thanks are due to Nicolas Mauron for pointing out to me the existence of R Aquarii.

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Aluminization of Mirrors

The Optical Laboratory, in charge of aluminizing, informs us that as a general practice, astronomical main mirrors are aluminized every 18 months (Fig. 1). In the case of small main mirrors (upper limit 1 m), it is intended to intercalate a washing between two aluminizations, with the main purpose of reducing the chemical effects on the mirror blank. Secondary mirrors, less exposed to dust, are not included in this scheme.

For national telescopes, the agreement of the person responsible for the telescope is requested before any action is taken; so they are previously informed when a new aluminization is deemed necessary.

Laboratory tests performed with the fiber optic reflectometer have shown the following evolution (Fig. 2):