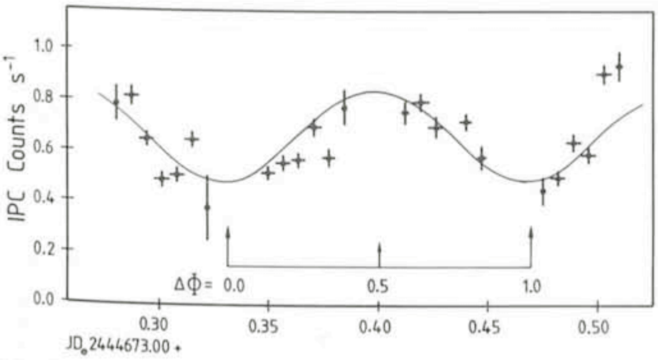

Fig. 4: *The X-ray lightcurve of V603 Aql, measured in the 0.15–4.5 keV range. The dots represent count rates which have been binned in 10-minute intervals. The abscissa is scaled in Julian days, and relative phase units $\Delta\Phi$ are indicated, which have been computed with the optical spectroscopic period. Orbital phase-dependent flux variations are obvious.*

the optical continuum and emission line flux with the orbital period.

X-ray Satellite Observations

More insight into these problems was expected from phase-dependent X-ray measurements which were carried out in 1981 with the Einstein satellite.

Nova Aquilae 1918 was found to be one of the brightest X-ray emitters among cataclysmic variables, with a luminosity of up to 3×10^{33} erg s^{-1} in the 0.2–20 keV energy band. Fig. 3 shows a contour map with lines of constant X-ray surface brightness for a one square degree field centered on the old nova. V603 Aql shows as a point source, which means that the observed X-rays are emitted somewhere within the close binary system, and not from an extended shell. The X-ray position coincides with the astrometric position of the optical counterpart.

The source was monitored over a time interval of about 20,000 seconds, corresponding to approximately 1.7 orbital cycles. X-ray lightcurves were measured in the Image Proportional Counter (0.15–4.5 keV) and Monitor Proportional Counter (2–6 keV) ranges. Fig. 4 displays the X-ray flux variations in the 0.15–4.5 keV energy band. The smooth solid line illustrates the best representation of the data. Obviously, the general trend of the flux variations follows the orbital revolution. The count rates have been binned in 10-minute intervals.

Integration in shorter time steps of 100 second length shows the presence of rapid X-ray flickering with an amplitude of about $0^m.8$. These variations exceed the optical fluctuations by a factor of 2 to 3, but occur on a comparable time scale of a few hundred seconds. This suggests that the optical and X-ray flickering are an outcome of the same mechanism for the generation of the radiation, and that the optical emission may at least partly emerge from reprocessing of the X-rays.

The X-ray source is almost certainly connected with the transfer of matter which is lost by the Roche lobe filling secondary star and accreted by the white dwarf, either directly along magnetic field lines, or from the inner edge of the accretion disk. The observed high X-ray temperature (20–30 keV) and luminosity (3×10^{33} erg s^{-1}) can be explained by applying models for the emission of a hot transition region between the disk and the surface of the star. Such a hot region can persist due to the more or less continuous release of the kinetic energy and momentum of matter rotating in the disk. An accretion rate of only a few 10^{-10} solar masses per year is sufficient to produce the observed X-ray flux with the radiating power of the Sun.

Optical and X-ray data show that the orbital inclination of the binary is small. Why is the X-ray flux then modulated with the orbital period, if we can rule out a partial eclipse of the X-ray source by the secondary star or by material contained in the accretion disk? The variation must be due to the source geometry or to a variable mass accretion rate correlated with the binary orbit. It still remains open, whether the white dwarf is corotating, and a weak magnetic field channels material to particular surface areas, or wheter the orbit is eccentric, leading to variable mass accretion.

We need more observations before a definite model can be developed for this system, which might serve as a representative example for a whole class of by now extensively discussed objects. Especially phase-dependent observations carried out simultaneously in the optical, X-ray, and possibly other spectral ranges would be most useful.

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 brigth 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 930 (Kafatos, Michalitsianos, *Nature*, **298**, 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 $\geq$ 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

1980 is clearly visible as well as a new feature which extends about 4 arcsec from the star towards a position angle $\sim 40°$. 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 signaled by Kafatos et al. (*Ap. J.*, **267,** L 103, 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 $m_{Mira} = 11$, 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 overexposition 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.

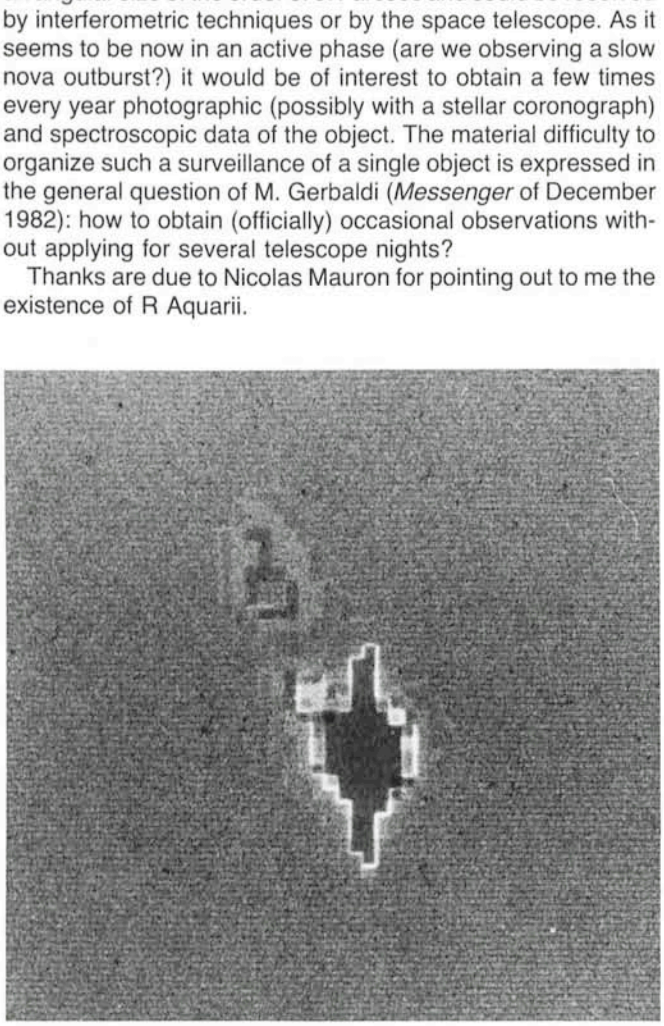

Fig. 1: *This photograph of the central region of the R Aquarii complex has been obtained on November 25 1982. The minimum of the Mira was expected for December 3. A curved jet constituted by 2 nodules described in the text extends to 10 arcsec from the star, north-eastwards (north is at top, east to the left). At the distance of the star (200 pc) these 10 arcsec correspond to a linear size of 1,000 astronomical units. The vertical line in the middle of the picture is due to a saturation of the CCD in the zone of the bright star: the excess of charges is transferred above and below the overexposed region. (V filter; 2 min exposure; 1 pixel = 0.471 arcsec.)*

List of Available ESO Publications

Some copies of the following ESO publications are still available and may be ordered at ESO-Garching:

Conference on "The Role of Schmidt Telescopes in Astronomy", Hamburg, March 21–23, 1972. Proceedings. Ed. by U. Haug, 160 p. (DM 16.—).

ESO/SRC/CERN Conference on "Research Programmes for the New Large Telescopes", Geneva, 27–31 May 1974. Proceedings. Ed. by A. Reiz, 398 p. (DM 25.—).

ESO Conference on "Optical Telescopes of the Future", Geneva, 12–15 December 1977. Proceedings. Ed. by F. Pacini, W. Richter and R. N. Wilson, 554 p. (DM 40.—).

"Modern Techniques in Astronomical Photography", May 1978. Proceedings. Ed. by R. M. West and J. H. Heudier, 304 p. (DM 16.—).

ESA/ESO Workshop on "Astronomical Uses of the Space Telescope", Geneva, 12–14 February 1979. Proceedings. Ed. by F. Macchetto, F. Pacini and M. Tarenghi, 408 p. (DM 40.—).

"Dwarf Galaxies", Proceedings of the First ESO/ESA Workshop on the Need for Coordinated Space and Ground-based Observations. Geneva, 12–13 May 1980. Ed. by M. Tarenghi and K. Kjär (free).

ESO Workshop on "Two Dimensional Photometry", Noordwijkerhout, 21–23 November 1979. Proceedings. Ed. by P. Crane and K. Kjär, March 1980, 412 p. (DM 40.—).

"Scientific Importance of High Angular Resolution at Infrared and Optical Wavelengths". ESO Conference. Garching, 24–27 March 1981. Proceedings. Ed. by M. H. Ulrich and K. Kjär, 444 p. (DM 50.—).

ESO Workshop on "The Most Massive Stars". Garching, 23–25 November 1981. Proceedings. Ed. by S. D'Odorico, D. Baade and K. Kjär, 366 p. (DM 50.—).

"The ESO/Uppsala Survey of the ESO (B) Atlas". Ed. by Andris Lauberts. 1982. 504 p. (DM 40.—).

"Evolution in the Universe". Symposium held on the occasion of the inauguration of the ESO Headquarters building in Garching on 5 May 1981 (DM 20.—).

ESO Workshop on "The Need for Coordinated Ground-based Observations of Halley's Comet". Paris, 29–30 April 1982. Proceedings. Ed. by P. Véron, M. Festou and K. Kjär. 310 p. (DM 35.—).

"Second ESO Infrared Workshop". Garching, 20–23 April 1982. Proceedings. Ed. by A. F. M. Moorwood and K. Kjär, 446 p. (DM 50.—).

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):