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Introduction

In 1948 the South African amateur astronomers de Kock and Kirchhoff were the first to notice that RR Tel had brightened to 7th magnitude. Subsequent examination of the Harvard Patrol plates showed that it had in fact reached a maximum in 1944 after rapidly brightening 7 magnitudes (Mayall, 1949). Prior to 1944 the object showed variations with a period of 387 days and an amplitude of up to 2 magnitudes in the blue. After the outburst the spectrum evolved in a manner characteristic of very slow novae: an F5 supergiant absorption spectrum gave way to strong permitted and forbidden emission lines. The ionization levels characterising the emission increased with time. The spectral development has been extensively studied and has been well summarised for the period up to 1973 in the Thackeray's (1977) monograph on the subject. More recent spectra (e.g. Penston et al, 1981) show that although the trend towards species of increasingly higher ionization has probably stopped, the visual and near ultraviolet light is still completely dominated by strong emission lines with a weak blue continuum.

Most if not all slow novae and symbiotic stars are now thought to be interacting binary systems, in which a hot subdwarf (probably a white dwarf) accretes matter from a cool giant. In some cases, including RR Tel, the cool giant is a Mira variable. Such systems have been modelled by various authors (e.g. Bath 1977).

Infrared Photometry

The SAAO infrared (JHKL) photometry of RR Tel from 1975 to 1980 clearly shows variations with a period of about 387 days. This period, which has an amplitude of 0.6 mag at 2.2μ, confirms the suggestion of Feast and Glass (1974) that the RR Tel system contains a Mira. The suggestion is further supported by the observation of TiO in the photogra-

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phic spectrum (Webster 1974) and H_2O in the infrared (Allen et al. 1978).

Mayall's pre-outburst photographic photometry is quite consistent with the idea that a normal Mira was present in the system before the outburst. Where the amplitude of the variations was low we can simply assume that the photographic region was dominated by emission from the hot binary component. It thus seems probable that the Mira has been present in the RR Tel system throughout its history and that it was not fundamentally affected by the nova outburst.

As well as being a slow nova RR Tel appears to be a typical member of the subgroup of symbiotics which contain a Mira variable and an infrared dust excess. Other symbiotics of this type for which periods have been derived at SAAO are RX Pup (580 days), He 2-38 (431 days) and He 2-106 (176 days). It is notable that these objects have a large range in periods, indicating that Miras are not of a very restricted population type.

It has been suggested (e.g. Feast et al. 1977) that the infrared excess in symbiotic systems such as RR Tel implies the existence in them of larger quantities of dust than are associated with solitary Miras. An alternative explanation, which is consistent with the photometry, is that the hot binary component provides an extra source of excitation, giving rise to a larger infrared flux for the same quantity of dust. Photometry at longer wavelengths (5-20μ) is required to clearfy this problem. The observations discussed here are to be published in full elsewhere. We are indebted to SAAO colleagues for use of data in advance of publication.

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