

Variable Star of the Year 2013

RR Tauri

RR Tau was discovered in 1900 by Lydia Ceraski on plates taken at Moscow observatory as a star which varies between magnitude 9.0 and fainter than 12.0. It was however to be another 60 years before RR Tau caught the attention of the astronomical world.

In 1960 the American astronomer George H. Herbig first discussed a new group of star whose spectral type were A or B and displayed prominent emission lines in the spectra. Herbig's original list consisted 26 candidates of which RR Tau was one. These objects were sometimes closely associated with nebulosity, in which the star itself illuminates the nebula and surrounding region, whilst other stars of this type were shown to be isolated objects, yet shared many of the characteristics of the former. These stars became known as HAEBE stars (Herbig Ae/Be stars). Roughly a quarter of known HAEBE stars belong to the group of objects known as UXOR stars (named after the prototype star UX Orionis), pre-main sequence young stellar objects whose high level of activity, and in particular the deep minimum brightness observed at irregular intervals, is thought to be caused by the presence of non uniform gas clouds orbiting the star. In RR Tauri's case, the cloud is thought to be larger than the star itself, yet smaller than the circumstellar envelope surrounding the star.

The nebula associated with RR Tau was discovered by Herbig in the 1950's and can be seen in the Digitised Sky Survey. Careful CCD monitoring of the nebula will show changes in intensity over time, and although the brightest part is extremely small (several arc seconds) comparing variations in both star and nebula is an interesting observing project for suitably equipped observers.

The classification of RR Tau is somewhat confusing. The General Catalogue of Variable Stars (GCVS) classifies RR Tau as type INSA (Orion variables), and does not recognise UXOR as a classification in itself. Yet the majority of the literature classifies RR Tau as type UXOR! It seems that UXOR is the most popular classification for RR Tau despite the GCVS entry.

Optically RR Tau is an exciting star to observe. Varying between magnitudes 10.0 and 14.5, a 15cm telescope will easily show it whilst near maximum brightness, but a 20 or 25 cm telescope may be needed to show it at minimum brightness, depending on where you live. The variations are quite irregular and unpredictable. At times the changes will be slow and in the order of one magnitude over several weeks, whilst at others a 1-2 magnitude change can be seen over just a few nights. This makes RR Tau a perfect star to observe at every possible opportunity. The light curve can look 'messy', as this is due to the rapid changes in brightness in just a few days.

The observing season runs from September to late April or early May, and is also interrupted by the presence of the Moon during this period. The field is easy to find lying just over 3 degrees SW of the 1.7 magnitude star beta Tau (El Nath or Alnath), and 30 arc minutes north of the 5th magnitude star 125 Tau.

The accompanying light curve is taken from the BAAVSS on-line data archive (<http://britastro.org/~vssdb/>). Contributing observers are *K.G Andersson, R.J Bouma, B.H Granslo, H. McGee, E. Muylaert, G. Poyner, V. Tuboly*

