RevMexAA (Serie de Conferencias), **33**, 3–4 (2008)

HOW I CAME TO THE MASSIVE STARS GAME

Virpi S. Niemela[1]

RESUMEN

Como editores, deseamos incluir aquí una transcripción de la charla que diera Virpi en el acto de apertura de la Reunión. Aspira a reflejar lo más fielmente el espíritu de la presentación, aunque seguramente no coincida con lo que Virpi hubiera incluido en una presentación formal.

ABSTRACT

We wish to include here a transcription of Virpi's talk in the opening of the Conference. It aims to reflect the spirit of Virpi's presentation, although it will certainly differ from what she would have included in a formal printed contribution.

Key Words: stars: early-type — stars: fundamental parameters

Good morning. Welcome everybody to this beautiful place where my students have organised this meeting.

I will first tell you shortly my first experiences with the game of massive stars. When I was an undergraduate student, one day Professor Sahade came by my desk with a box full of photographic spectra (those on pieces of glass, you know) and asked: "Would you like to analyse this?" "Of course", I said. I had never seen a stellar spectrum in my life so I thought that all the spectra should be the same as those he gave me. I looked at them from every side, turning them around and around until someone told me that the first thing I should do was to identify the comparison lines! So I did and I found where the blue end and the red end were, and the spectrum looked quite the one shown in Figure 1. It is γ^2Velorum, a famous binary system, the closest one in the solar neighbourhood. Professor Sahade told me it was a binary and that he expected me to find its period. There were no computers, no program to try periods, so we had to assemble it piece by piece. Fortunately, people in India at the Kodaikanal Solar Observatory decided to observe γ^2Velorum every night, and so they did for several months and they found out that the period was 78 days, which I could have never found from my spectra alone. But I checked the period with the spectra I had, and the theme of binary stars with WR components has been one of my main research interests since then. After analysing a large number of stars, it turned out that there are actually very few stars with spectra like this one.

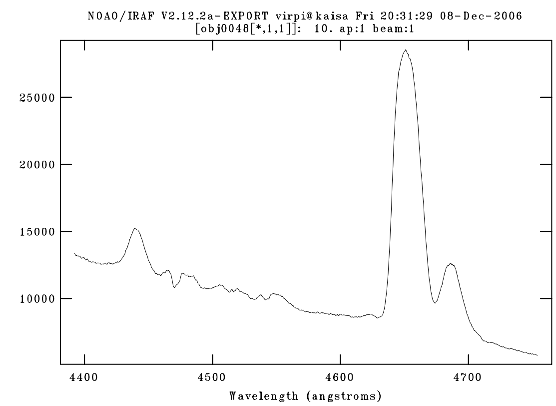

Fig. 1. Optical spectra of γ^2Velorum.

I will also like to make a brief history of international massive stars symposia, which have been like massive stars "family meetings" at the same time. When I was still an undergraduate student, Professor Sahade organised a Symposium at Buenos Aires in August, 1971, and it was the first Massive Stars meeting I attended. You may recognise some of the persons in Figure 2, including that interesting young man in the second row, fourth from left, which is Nolan Walborn, also present today. Other pioneers on massive stars research were also there, together with local students and researchers. In that meeting Rick Thomas was there, and he kept telling us that our interpretations were wrong, sparkling endless discussions. He did not attend following meetings and I always missed him because we all then agreed in our conclusions, and those fruitful discussions were lost. The next one was held in 1978 at Qualicum Beach in Canada. For this meeting we had just learned, from UV observations, that mass

[1]Facultad de Ciencias Astronómicas y Geofísicas, Universidad Nacional de La Plata, Argentina.

TABLE 1

MASSIVE STARS SYMPOSIA

IAUS	Title	Place	N
49	Wolf-Rayet and High Temperature Stars	Buenos Aires, Argentina, August 1971	40
83	Mass Loss and Evolution of O-type Stars	Qualicum Beach, Canada, June 1978	85
99	Wolf-Rayet Stars: Observations, Physics, Evolution	Cozumel Island, Mexico, September 1981	70
143	Wolf-Rayet Stars and Interrelations with other Massive Stars in Galaxies	Island of Bali, Indonesia, June 1990	80
163	Wolf-Rayet Stars: Binaries, Colliding Winds, Evolution	Island of Elba, Italy, May 1994	90
193	Wolf-Rayet Phenomena in Massive Stars and Starburst Galaxies	Puerto Vallarta, Mexico, November 1998	160
212	A Massive Star Odyssey: from Main Sequence to SN	Island of Lanzarote, Spain, June 2002	160

Fig. 2. Meeting picture of IAU Symposium 49, held at Buenos Aires, Argentina, 1971.

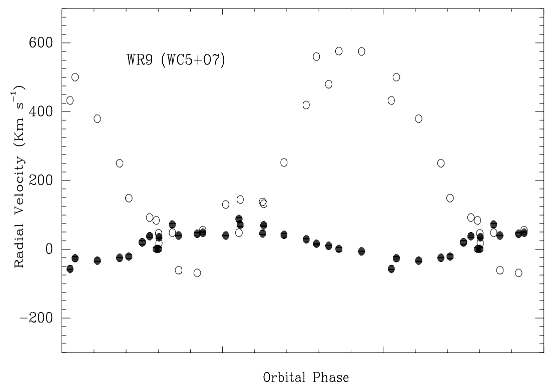

Fig. 3. Filled circles represent radial velocities of the O7 component, and open circles those of CIV 4652 emission of the WC5 component. They are phase-shifted by about 2 days (0.15 P).

loss was grossly affecting the evolution of all massive stars, not only a few ones. This meeting was the first of a series of what was later to be known as the "Beach Symposia". I have included in Table 1 the Meeting title, location, date and number of participants, the last column just to see how the massive stars family has kept growing throughout the years. Note the large increase in participants for the meeting held in Puerto Vallarta, as we included the 'starburst galaxies' topic. The next symposia, I have heard, will be held in Hawaii in 2008 and you will examine massive stars from the local neighbourhood down to redshift ~ 6. I guess there will be lots of people around!

In each of these symposia, I always presented a new orbit for a new WR binary. And this meeting will be no exception. In this case I would like to show you a big problem that we have been ignoring. Figure 3 shows WR 9 (from the catalog of van der Hucht). This is the only system with a WC 5 as one of the components in our Galaxy, although there are quite a few of them in the MCs. I have recalculated the orbit and it is obvious that the orbital motion of the carbon emission lines is phase shifted with respect to the orbital motion of the absorption lines of the O star. The phase shift is about 2 days for this case, but the effect is present almost for all of these systems and I would therefore not put too much weight on any mass determination if we do not have a decent orbit. I suggest that what we should do now that we have nice CCD detectors which helps to see the absorption lines is to derive good orbits for the normal component and refer all the emission lines to the orbit of the normal star, and try to devise a model to explain the presence of phase shifts or amplitude variations for different emission lines. This phenomenon happens also on cataclysmic binaries, and binaries which have accretion disks, but we are used to see WR stars as nice spherically symmetric stars losing mass, without the presence of accretion disks.

Thank you.

DISCUSSION

A. Moffat - Virpi, you make many of us feel very emotional! I just wanted to note that the WR binary you showed, WR9, is actually a WC4+O7 due to wind-wind collisions enhancing CIII 5696 (which also explains the two day phase shift you noted).

V. Niemela - Maybe, but the phase shifts are also detected with later type WRs, such as γ^2 Velorum.