The Be and B[e] phenomena

Anahí Granada
Facultad de Ciencias Astronómicas y Geofísicas, Universidad Nacional de La Plata. Argentina.

Apart from the key programs, VLTI/AMBER general goals include the study of the environment of hot stars. The availability of an instrument with milli-arcsecond resolution results of great importance for people who are interested in the study of emission line stars because it provides an invaluable tool to study the innermost part of the circumstellar environment of these objects.

Be stars are B type non-supergiant stars that have ever exhibited Hα in emission, while stars presenting the B[e] phenomenon, show in addition emission in forbidden and low-excitation permitted lines and have strong IR excesses. Because of their strong emission in IR hydrogen lines, Be and B[e] stars are supposed to be surrounded by a large circumstellar rotating and/or expanding envelope.

AMBER has already been used to set constraints on the size, shape and kinematics of the winds of α Arae and κ CMa (Meilland et al. 2007a, 2007b), two Be stars which turned out to be very different among them. It was found in the former the presence of a keplerian circumstellar disk with an enhanced polar wind, but the latter cannot be fit with neither a two-component wind nor the one-arm oscilation model. The B[e] star CPD-57°2874 was also observed with this instrument revealing non-spherical gas and dust envelope (Domiciano de Souza et al. 2007).

Throughout the last years our research team has been studying the Be and B[e] phenomena from a theoretical and spectroscopic point of view. Among the emission line objects we believe that there are two well studied intriguing objects which could be good candidates to be observed with VLTI facilities.

FS CMa (HD 45677) is a widely studied B[e] star with an enormous IR excess (V=7.99, K=4.78). It is a B2V[e] star with H recombination and forbidden lines in emission. This object shows simultaneously some characteristics of being a YSO and a more evolved object (UnclB[e] stars, Lammers et al. 1998). It has gone through long-term photometric variations in the optical range, but its color indexes changed little in relation to the strong brightness changes. Polarimetric studies support a disc-like geometry of circumstellar dust, and by means of speckle interferometry, it was resolved a 0,1" structure in 4,8 μm, which at a distance of ~350 pc results in an extension of 35 AU.

HD 50138 has photometric similarities to FS CMa in the IR wavelength range (V=6.61, K=4.15) and forbidden lines of single ionized species, but it is a later type object (B6V[e]). Polarimetry has given evidence of a non-spherical envelope with lower densities than that of FS CMa (cf. Miroshnichenko 1998). The Hipparcos distance of this object is ~290 pc.

Due to the observed peculiarities in both objects, they result good candidates for the AMBER/VLTI spectro-interferometer, using medium spectral resolution, to reveal the nature and structure of their circumstellar environments.

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