

# Non-thermal radio emission from O-type stars. IV. Cyg OB2 No. 8A

R. Blomme (1), M. De Becker (2,3), D. Volpi (1), G. Rauw (2)

(1) Royal Observatory of Belgium

(2) Universite de Liege, Belgium

(3) Observatoire de Haute-Provence, France

We study the non-thermal radio emission of the binary Cyg OB2 No. 8A, to see if it is variable and if that variability is locked to the orbital phase. We investigate if the synchrotron emission generated in the colliding-wind region of this binary can explain the observations and we verify that our proposed model is compatible with the X-ray data.

We use both new and archive radio data from the Very Large Array (VLA) to construct a light curve as a function of orbital phase. We also present new X-ray data that allow us to improve the X-ray light curve. We develop a numerical model for the colliding-wind region and the synchrotron emission it generates. The model also includes free-free absorption and emission due to the stellar winds of both stars. In this way we construct artificial radio light curves and compare them with the observed one.

The observed radio fluxes show phase-locked variability. Our model can explain this variability because the synchrotron emitting region is not completely hidden by the free-free absorption. In order to obtain a better agreement for the phases of minimum and maximum flux we need to use stellar wind parameters for the binary components which are somewhat different from typical values for single stars. We verify that the change in stellar parameters does not influence the interpretation of the X-ray light curve. Our model has trouble explaining the observed radio spectral index. This could indicate the presence of clumping or porosity in the stellar wind, which - through its influence on both the Razin effect and the free-free absorption - can considerably influence the spectral index. Non-thermal radio emitters could therefore open a valuable pathway to investigate the difficult issue of clumping in stellar winds.

Reference: Accepted by A&A

Status: Manuscript has been accepted

Weblink: <http://arxiv.org/abs/1006.3540>

Comments:

Email: [Ronny.Blomme@oma.be](mailto:Ronny.Blomme@oma.be)