

QUASI-SEPARATRIX LAYERS AND THEIR RELATIONSHIP WITH SOLAR FLARES

L.G. Bagalá¹, C.H. Mandrini¹, M.G. Rovira¹, P. Démoulin², and J.C. Hénoux²

Recent results obtained about solar flares show that the energy release occurs exclusively at the location of separatrices. In the work the photospheric field is extrapolated to the corona using a series of subphotospheric magnetic sources and the method used to determine the location of separatrices is based in the connectivity between the sources. Priest & Démoulin (1995) have explored a way of generalising the concept of separatrices to magnetic configurations without field-line linkage discontinuities. They propose that magnetic reconnection may also occur in 3D in the absence of null points at "quasi-separatrix layers" (QSLs), which are regions where there is a drastic change in field-line linkage.

We show that the location of H α and UV flare brightenings is related to the properties of the field-line linkage of the underlying magnetic region, as expected from these developments in 3D reconnection theory (Démoulin et al. 1995). The coronal magnetic field is computed from the observed photospheric field using a linear force-free field extrapolation. The QSLs are determined by a computer algorithm. The H α and UV kernels are found in these restricted regions where the QSLs are thinner than 1 mm. Even for the highly-conductive plasma of the corona these extremely thin layers behave physically like separatrices: the breakdown of ideal MHD and the release of free-magnetic energy occur at those locations giving secondary effects, like kernels after transport of the energy to the chromosphere. These results allow us to constrain present models of solar flares.

Priest, E. & Démoulin, P. 1995, JGR, in press
 Démoulin P., Hénoux, J.C., Priest, E., & Mandrini, C.H. 1995, A&A ,in press

¹Instituto de Astronomía y Física del Espacio, IAFE-CONICET, Buenos Aires, Argentina

²Observatoire de Paris, DASOP - CNRS, Meudon France

THE SPECTRUM OF THE WOLF-RAYET BINARY SYSTEM HD 5980 AFTER THE LUMINOUS BLUE VARIABLE TYPE OUTBURST

R. Barbá^{1,2}, N. Morrell^{1,2}, V. Niemelä^{1,3}, G. Bosch^{1,4}, F. González^{4,5}, E. Lapasset^{2,5}, O. Ferrer^{1,2}, E. Brandi^{1,3}, S. Cellone^{1,4}, B. García^{2,6}, S. Malaroda^{3,6}, H. Levato^{4,5}, C. Donzelli^{4,5}, C. Feinstein^{1,2}, and M. Rich⁷

The Wolf-Rayet eclipsing binary HD 5980 in the Small Magellanic Cloud has shown a peculiar spectral behavior during the past years changing its spectral type from WN3 to a late type WN. The star showed a sudden light increase ($\Delta V \sim 4$) that began about mid 1994 (Barbá & Niemelä 1994, IAU Circ. 6099). During this eruption, the spectrum of HD 5980 became similar to that of a Luminous Blue Variable. This is unprecedented among the WNE stars and very massive binary systems. Moreover, the kind of metamorphosis as observed in HD 5980 is unforeseen in evolutionary scenarios of massive stars.

Here we report results from optical CCD spectra gathered at CASLEO, San Juan, and Córdoba Observatory, Argentina, after October 1994, when the outburst of HD 5980 was discovered. We have observed the extraordinary transformations in the spectrum of HD 5980 over five consecutive orbits.

Among the most striking features shown by our data is the remarkable variation in strength of the He II 4686Å emission line whose W_λ increased from 7Å to 70Å from one orbital cycle to the following (November 1994).

Slowly the spectrum of HD 5980 is returning to its previous WR type appearance, at present resembling again a later type WN. Our observations indicate that the binary component which underwent the sudden eruption is the one seen in front of the system during the primary eclipse.

¹Fac. Cs Astronómicas y Geofísicas, UNLP, Argentina

²Member of the Carrera del Investigador Científico, CONICET, Argentina

³Member of the Carrera del Investigador Científico, CIC, Provincia de Buenos Aires, Argentina

⁴Fellow of CONICET, Argentina

⁵Observatorio Astronómico Córdoba, Argentina

⁶Complejo Astronómico El Leoncito, San Juan, Argentina

⁷Department of Astronomy, Columbia University, USA