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Investigating DACs/SACs Phenomena in Hot Emission Stars and Quasars

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1. Introduction

The spectra of hot emission stars and AGNs present peculiar profiles that result from dynamical processes such as accretion and/or ejection of matter from these objects. In the UV spectra of hot emission stars and AGNs the absorption lines have DACs or SACs that are shifted to the blue.

In the case of hot emission stars, DACs or SACs arise from spherical density regions around the star or from density regions far away from the star that present spherical (or apparent spherical) symmetry around their own center (Bates & Halliwell 1986; Danezis et al. 2005, 2006a). Similar phenomena can be detected in the spectra of AGNs. Wind (jets, ejection of matter etc.), BLR (Broad Line Regions) and NLR (Narrow Line Regions) are, probably, the density regions that construct these profiles of the spectral lines (Danezis et al. 2006a).

In order to study the observed peculiar profiles in the spectra of hot emission stars and AGNs, we use the GR model (Danezis et al. 2007). With this model we can reproduce the complex profiles of the spectral lines and we can calculate some important parameters of the density regions that construct the DACs-SACs, such as the apparent rotational and radial velocities of the absorbing or emitting density layers, the Gaussian typical deviation of the ions random motions and the optical depth in the center of the absorption or emission components (direct calculations). Indirectly we can calculate the random velocities of the ions, the FWHM, the absorbed or emitted energy and the column density.

In this paper we indicate that DACs and SACs phenomena, can explain the spectral lines peculiarity in hot emission stars and AGNs (Danezis et al. 2006b, 2008). We also try to connect the physical properties of absorption regions around stars and quasars.

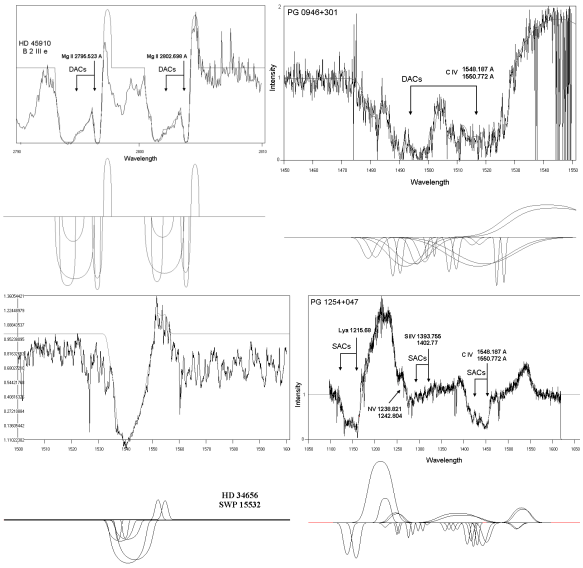

Figure 1.: Up: DACs in the spectra of Hot Emission Stars (left) and AGNs (right). Down: SACs in the spectra of Hot Emission Stars (left) and AGNs (right). Below the GR model fit one can see the analysis of the observed profile to its DACs or SACs.

2. Results and Discussion

Here we applied the GR model (Danezis et al. 2005, 2007) in order to fit some stellar and quasar's absorption lines (see Fig. 1). In both cases we can find blue-shifted components, which are indicating an outflow (wind) in both objects. However, there are differences in the velocities, i.e. naturally the outflow velocities in quasars are higher ($\sim$ several 1000 km/s). But, the line profiles (as e.g. P-Cygni profile) in both objects are similar, indicating that natural phenomena are similar, but with different physical properties.

As we can see in Fig. 1 (up-right) we can detect the DACs phenomenon in the spectra of some AGNs constructing complex profiles. The presence of DACs phenomenon in the spectra of some AGNs leads us to search also for SACs in these spectra. In Fig. 1 (down-right), using the GR model, we can see that the complex structure of many AGNs' spectral lines can be explained with SACs phenomenon.

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