A NEW METHOD FOR THE CALCULATION OF COLUMN DENSITY USING THE GR MODEL. AN APPLICATION ON THE C IV, N IV AND N V SPECTRAL LINES IN THE SPECTRUM OF THE O-STAR HD 149757 (ζ OPH)

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Abstract. In this context, our research group developed GR model and A.S.T.A. software, which can analyse the complex DAC/BAL profiles to individual components. By applying a series of strict fitting criteria, we analyse each DAC/BAL to the uniquely determined number of components they consist of and guarantee the uniqueness of the best fit. For every absorption component we calculate the radial (V_{rad}) and rotational (V_{rot}) velocity, the FWHM, the optical depth at line centre (τ_0), the EW and the column density (N). By utilizing different epoch spectra, we probe the time variability of each individual component.

The column density is a crucial parameter because it allows the investigation of the internal structure of clouds that produce the DAC/BAL components. Column density is a measure of the amount of intervening matter between an observer and the object being observed and is representative of the projected density of the clouds that produce DACs/BALs along a specific line of sight. Thus, the time scale-variations of the components' column densities can provide useful insights on the relative number of absorbers of each absorbing cloud in the line of sight.

In this paper, in the context of GR model, we present a new method for calculating the column density. We use GR model in order to analyse the broad absorption troughs of C IV, N IV and N V, in different epoch spectra, of the O-star HD149754 (ζ Oph), to the uniquely determined number of components they consist of and we study the variability of the components' column densities in a time interval of 13 years. in multicomponent fitting of the above-mentioned spectral profiles is performed using A.S.T.A. software developed by the Astrophysical Spectroscopy Team of the National and Kapodistrian University of Athens.