where $F(r)$ is the total ionizing flux at the radius r.

When two or more outflows are put together they are assumed to be distributed such that the observed spectrum is the result of the addition of all components. Thus, the radiative flux in each bin of frequency for the composite spectrum is

$$F_\nu = \sum_{i=1}^{m} f_\nu(x_i), \tag{12}$$

where m is the number of absorbing clouds in the line-of-sight, $f_\nu(x_i)$ is the flux resulting from the pass of the continuum radiation through the absorbing cloud i, and x_i is the normalized spatial radius of the cloud.

In Ramírez et al. (2005), it is shown that in order to fit the line profiles in NGC 3783 a geometry for the gas distribution different from spherical is required. Such a deviation from spherical geometry has two effects. In the normalized notation the number density is

$$n_H(x) = n_0 x^{-2+\kappa} w^{-1}, \tag{13}$$

where $0 \leq \kappa \leq 2$. A positive value of κ implies that the gas flow dilutes more slowly than in a free spherical expansion, i.e. that there are sources of gas embedded in the flow, or that the flow is confined. A negative value corresponds to sinks of gas in the flow, or expansion of an initially confined flow in a flaring geometry.

Secondly, we allow the radiation flux to have a form

$$F = F_0 \times x^{-2-p}, \tag{14}$$

where p is an index to mimic a deviation of flux from the pure geometrical dilution case. This is expected if the medium between clouds has a significant optical depth (if p is positive) or if there are sources of radiation embedded in the flow (if p is negative).

4. ASSUMPTION ABOUT THE NUMBER DENSITY

Before going into the presentation of the results we would like to highlight important differences between the underlying physical/geometrical motivation of the present work and previous ones. After reviewing the single (geometrically thick) model and the clumpy (geometrically thin) model, we favored the latter, and require for the production of the line profile found in the spectrum of Seyfert galaxies that $\Delta R/R \ll 1$ (also based on results by Gabel et al. (2005) from UV data).

Based on UV CIII* density constraints (Gabel et al. 2005), the electron density for the absorber could be $n_e \approx 10^4$ cm^{-3}. With this (using equation 11 and $n_H \approx n_e/1.2$), the distance between the absorber and the central source is $R \approx 25$ pc ($\approx 10^{20}$ cm). As in Gabel et al. (2005), the low ionization species (XLI in that paper) seems to share the same kinematics with the UV absorber. Using a typical luminosity L for this object of $\approx 10^{44}$ erg s^{-1}, $n_H \approx 10^4$ cm^{-3}, and an ionization parameter of $\xi \approx 1$, $R \approx 10^{20}$ cm; similar to that computed by Gabel et al. (2005); but if we take $n_H \approx 10^{11}$ cm^{-3}, as is required for $\Delta R \ll R$, then $R \approx 10^{16.5}$ cm. This is not in contradiction with Krongold et al. (2005), where they set limits on the density and location of the absorber; with $n_e > 10^4$ cm^{-3}, and $D < 5.7$ pc. However, is clearly different from the computation made by Netzer et al. (2003), of $n_e < 5 \times 10^4$ cm^{-3} $D > 3.2$ pc for the $\log(U_{\rm ox}) = -2.4$ component, $n_e < 10^5$ cm^{-3} $D > 0.63$ pc for the $\log(U_{\rm ox}) = -1.2$ component, and $n_e < 2.5 \times 10^5$ cm^{-3} $D > 0.18$ pc for the $\log(U_{\rm ox}) = -0.6$ component. It is clear that some of the differences in the estimations can be due to differences in the nature of the physics behind the estimations. In Krongold et al. (2005) (and also Reeves et al. 2004, for the Fe K shell), the fundamental assumption behind the computation of n_e is that the absorber responds instantaneously to changes of flux of the ionizing source, while in Netzer et al. (2003) the estimations are based on temperature derived models, average recombination rates and no response to continuum variations on timescales of 10 days. And, for our purposes, this basically translates into differences between the two proposed physical mechanisms: thermally accelerated winds, which in principle have to consider a sublimination radius for the material not being evaporated, and radiatively accelerated winds with origin possibly in the accretion disk of subparsec scale; both are competitor theories in the explanation of the origen of the warm-absorber outflows.

5. RESULTS AND DISCUSSIONS

In Figure 4 we show the variation of the different variables governing the kinematics and the ionization structure of one of our models (model A). This is a wind with a velocity slope $\beta = 2$, $\kappa = 1.5$ and $p = 1.5$. The number of kinematic components m is 11. The assumed abundance is solar, as is given in Table 1, and each component has a column density $N_H = 5 \times 10^{20}$ cm^{-2}. In this model the variation in the ionization parameter is $\log \xi = 3.5 - (-0.65)$ [erg cm s^{-1}], where the "launching" ionization parameter is defined as $\log \xi_0 = 3.5$ [erg cm s^{-1}], and the variation in density $\log n_H = 11.4 - 10.26$ [cm^{-3}].