

- **wndabs, zwndabs: photo-electric absorption, warm absorber**

Photo-electric absorption from approximation to a warm absorber using Balucinska,-Church, and McCammon (ApJ 400, 699) cross-sections. Relative abundances are set by the **abund** command.

$$M(E) = \begin{cases} 1 & E > E_w \\ \exp[-n_H \sigma(E)] & E \leq E_w \end{cases}$$

where $\sigma(E)$ is the photo-electric cross-section (NOT including Thomson scattering) and

par1= n_H equivalent hydrogen column (in units of 10^{22} atoms cm^{-2})

par2= E_w window energy (keV)

The **zwndabs** variant allows the user to specify a (fixed) redshift and uses the corresponding formula:

$$M(E) = \begin{cases} \exp[-n_H \sigma(E[1+z])] & E \leq E_w \\ 1 & E > E_w \end{cases}$$

with parameters:

par1= n_H equivalent hydrogen column (in units of 10^{22} atoms cm^{-2})

par2= E_w window energy (keV)

par3= z redshift