

## ireflect: reflection from ionized material

Convolution model for reflection from ionized material according to the method of Magdziarz & Zdziarski (1995, MNRAS, 273, 837). This is a generalization of the pexriv and bexriv models. Ionization and opacities of the reflecting medium is computed as in the absori model. The reflection component alone can be obtained for  $|rel_{refl}| < 0$ . Then the actual reflection normalization is  $|rel_{refl}|$ . Note that you need to change then the limits of  $|rel_{refl}|$  excluding zero (as then the direct component appears). If  $E_c = 0$ , there is no cutoff in the power law. The metal and iron abundance are variable with respect to those set by the command **abund**.

When using this model it is essential to extend the energy range over which the model is calculated both on the high and low end. The high end extension is required because photons at higher energies are Compton down-scattered into the target energy range. The low energy extension may be required to calculate ionization fractions correctly. The energy range can be extended using the extend command. The upper limit on the energies should be set above that for which the input spectrum has significant flux. To speed up the model, calculation of the output spectrum can be limited to energies below a given value by using **xset** to define IREFLECT\_MAX\_E (in units of keV). For instance, suppose that the original data extends up to 100 keV. To accurately determine the reflection it may be necessary to extend the energy range up to 500 keV. Now to avoid calculating the output spectrum between 100 and 500 keV use the command **xset IREFLECT\_MAX\_E 100.0**.

The core of this model is a Greens' function integration with one numerical integral performed for each model energy. The numerical integration is done using an adaptive method which continues until a given estimated fractional precision is reached. The precision can be changed by setting IREFLECT\_PRECISION eg **xset IREFLECT\_PRECISION 0.05**. The default precision is 0.01 (ie 1%).

par1	reflection scaling factor (1 for isotropic source above disk)
par2 = z	redshift
par3	abundance of elements heavier than He relative to the solar abundances
par4	iron abundance relative to the above
par5	$\cos i$ , the inclination angle
par8	disk temperature in <i>K</i>
par9	disk ionization parameter, $\xi = 4\pi \frac{F_{ion}}{n}$ , where $F_{ion}$ is the 5eV – 20keV irradiating flux, n is the density of the reflector; see Done et al., 1992, ApJ, 395, 275.

