

- **smaug: optically-thin, spherically-symmetric thermal plasma.**

This model performs an analytical deprojection of an extended, optically-thin and spherically-symmetric source. A thorough description of the model is given in Pizzolato et al. (ApJ 592, 62, 2003). In this model the 3D distributions of hydrogen, metals and temperature throughout the source are given specific functional forms dependent on a number of parameters, whose values are determined by the fitting procedure. The user has to extract the spectra in annular sectors, concentric about the emission peak. The inner boundary (in arcmin), the outer by the fitting procedure. The user has to extract the spectra in annular sectors, concentric about the emission peak. The inner boundary (in arcmin), the outer boundary (also in arcmin), and the width (in degrees) of each annular sector are specified (respectively) by the three additional keywords XFLT0001, XFLT0002, and XFLT0003, to be added to the spectrum extension in each input file (e.g. with the ftool FKEYPAR). Some parameters of *smaug* define the redshift and other options (see below). The other, 'relevant' ones define the 3D distributions of hydrogen density, temperature and metal abundance, determined by a simultaneous fit of the spectra. The cosmological parameters can be set using the *cosmo* command.

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| par1 | central temperature [keV] |
| par2 | max difference of temperature [keV] |
| par3 | exponent of the inner temperature |
| par4 | radius of the inner temperature [Mpc] |
| par5 | exponent of the middle temperature |
| par6 | radius of the middle temperature [Mpc] |
| par7 | exponent of the outer temperature |
| par8 | radius of the outer temperature [Mpc] |
| par9 | central hydrogen density [cm ⁻³] |
| par10 | fraction of nH.cc relative to the 1st beta component |
| par11 | exponent of the first beta component |
| par12 | radius of the 1st beta component [Mpc] |
| par13 | exponent of the 2nd beta component |

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| par14 | radius of the 2nd beta component [Mpc] |
| par15 | central metallicity [solar units] |
| par16 | exponent of the metal distribution |
| par17 | radius of the metal distribution [Mpc] |
| par18 | redshift of the source |
| par19 | number of mesh-points of the dem summation grid |
| par20 | cutoff radius for the calculation [Mpc] |
| par21 | mode of spectral evaluation: 0 = calculate, 1 = interpolate, 2 = APEC interpolate |
| par22 | type of plasma emission code, 1 = Raymond-Smith, 2 = Meka, 3 = Meka, 4 = APEC |
| K | model normalisation ($n_H \cdot c^2$ [cm ⁻⁶]) |

Note that if the interactive chattiness level in XSPEC is set to a value > 10, **smaug** also prints on screen the following quantities:

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|----------------|--|
| H ₀ | Hubble constant [km/s/Mpc] |
| q ₀ | deceleration parameter |
| L ₀ | cosmological constant |
| DA | source angular distance [Mpc] |
| DSET | dataset no. to which the quantities listed below are |
| IN | inner rim of the projected annular sector [Mpc] |
| OUT | outer rim of the projected annular sector [Mpc] |
| WID | width of the projected annular sector [deg] |
| EVOL | emitting volume within the integration radius cutoff [Mpc ³] |

EINT emission integral within the integration radius cutoff [$\text{Mpc}^3 \text{ cm}^{-6}$]. If nH.cc is frozen to 1, the actual EI is obtained by multiplying this figure by the square root of the model normalisation

