URL: http://cxc.harvard.edu/ciao3.4/xscomptt.html
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AHELP for CIAO 3.4

xscomptt

Context: sherpa

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Synopsis

Comptonization spectrum after Titarchuk (1994). XSpec model.

Description

This is an analytic model describing Comptonization of soft photons in a hot plasma, developed by L. Titarchuk (see ApJ, 434, 313). This replaces the Sunyaev−Titarchuk Comptonization model in the sense that the theory is extended to include relativistic effects. Also, the approximations used in the model work well for both the optically thin and thick regimes.

The Comptonized spectrum is determined completely by the plasma temperature and the so−called "beta parameter" which is independent of geometry. The optical depth is then determined as a function of beta for a given geometry. Thus the fifth parameter − "approx" − switches between spherical and disk geometries so that beta is not a direct input here. This parameter MUST be frozen. If approx > 0, beta is obtained from the optical depth using analytic approximation (e.g. Titarchuk 1994). If approx < 0 and 0.1 < tau < 10, beta is obtained by interpolation from a set of accurately calculated pairs of beta and tau from Sunyaev and Titarchuk 1985 (A&A 143, 374).

In this incarnation of the model, the soft photon input spectrum is a Wien law [x^2 exp(−x) photons] because this lends itself to particularly simple analytical form of the model. For present X−ray detectors, this should be adequate. Note that in energy flux space the peak of the Wien law occurs at 3kT as opposed to 2.8kT for a blackbody. The spectral fitter is strongly urged to read the following references before using this model in order to fully understand and appreciate the physical assumptions made:

- Titarchuk, L., 1994, ApJ, 434, 313
- Hua, X−M., Titarchuk, L., 1995, ApJ, 449, 188
- Titarchuk, L., Lyubarskij, Y., 1995, ApJ, 450, 876

xscomptt Parameters

Number	Name	Description
1	Redshift	redshift, z
2	T0	soft photon (Wien) temperature (keV)
3	kT	plasma temperature (keV)
4	taup	plasma optical depth

5	approx	geometry switch. ABS(approx) <= 1: disk, > 1: sphere; if approx >= 0, use analytic approx for beta vs. tau; if approx < 0, get beta vs. tau from interpolation.
6	norm	normalization

This information is taken from the XSpec User's Guide. Version 11.3.1 of the XSpec models is supplied with CIAO 3.2.

Bugs

For a list of known bugs and issues with the XSPEC models, please visit the XSPEC bugs page.

See Also

sherpa

atten, bbody, bbodyfreq, beta1d, beta2d, box1d, box2d, bpl1d, const1d, const2d, cos, delta1d, delta2d, dered, devaucouleurs, edge, erf, erfc, farf, farf2d, fpsf, fpsf1d, frmf, gauss1d, gauss2d, gridmodel, hubble, jdpileup, linebroad, lorentz1d, lorentz2d, models, nbeta, ngauss1d, poisson, polynom1d, polynom2d, powlaw1d, ptsrc1d, ptsrc2d, rsp, rsp2d, schechter, shexp, shexp10, shlog10, shloge, sin, sqrt, stephi1d, steplo1d, tan, tpsf, tpsf1d, usermodel, xs, xsabsori, xsacisabs, xsapec, xsbapec, xsbbody, xsbbodyrad, xsbexrav, xsbexriv, xsbknpower, xsbmc, xsbremss, xsbvapec, xsc6mekl, xsc6pmekl, xsc6pvmkl, xsc6vmekl, xscabs, xscemekl, xscevmkl, xscflow, xscompbb, xscompls, xscompst, xsconstant, xscutoffpl, xscyclabs, xsdisk, xsdiskbb, xsdiskline, xsdiskm, xsdisko, xsdiskpn, xsdust, xsedge, xsequil, xsexpabs, xsexpdec, xsexpfac, xsgabs, xsgaussian, xsgnei, xsgrad, xsgrbm, xshighecut, xshrefl, xslaor, xslorentz, xsmeka, xsmekal, xsmkcflow, xsnei, xsnotch, xsnpshock, xsnsa, xsnteea, xspcfabs, xspegpwrlw, xspexrav, xspexriv, xsphabs, xsplabs, xsplcabs, xsposm, xspowerlaw, xspshock, xspwab, xsraymond, xsredden, xsredge, xsrefsch, xssedov, xssmedge, xsspline, xssrcut, xssresc, xssssice, xsstep, xstbabs, xstbgrain, xstbvarabs, xsuvred, xsvapec, xsvarabs, xsvbremss, xsvequil, xsvgnei, xsvmcflow, xsvmeka, xsvmekal, xsvnei, xsvnpshock, xsvphabs, xsvpshock, xsvraymond, xsvsedov, xswabs, xswndabs, xsxion, xszbbody, xszbremss, xszedge, xszgauss, xszhighect, xszpcfabs, xszphabs, xszpowerlw, xsztbabs, xszvarabs, xszvfeabs, xszvphabs, xszwabs, xszwndabs

slang

usermodel

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