



AHELP for CIAO 3.4

**xsnsa**Context: [sherpa](#)

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## Synopsis

Spectra in the X–ray range (0.05–10 keV) emitted from a hydrogen atmosphere of a neutron star. XSpec model.

## Description

This model provides the spectra in the X–ray range (0.05–10 keV) emitted from a hydrogen atmosphere of a neutron star. There are three options:

- nonmagnetized ( $B < 1e8 - 1e9$  G) with a uniform surface (effective) temperature in the range of  $\log T_{\text{eff}}(\text{K}) = 5.0-7.0$  ;
- a field  $B = 1e12$  G with a uniform surface (effective) temperature in the range of  $\log T_{\text{eff}}(\text{K}) = 5.5-6.8$  ;
- a field  $B = 1e13$  G with a uniform surface (effective) temperature in the range of  $\log T_{\text{eff}}(\text{K}) = 5.5-6.8$  .

The atmosphere is in radiative and hydrostatic equilibrium; sources of heat are well below the atmosphere. The Comptonization effects significant at  $T_{\text{eff}} > 3e6$  K) are taken into account. The model spectra are provided as seen by a distant observer, with allowance for the GR effects. The user is advised to keep  $M_{\text{ns}}$  and  $R_{\text{ns}}$  fixed and fit the temperature and the normalization. MagField must be fixed at one of 0,  $1e12$ , or  $1e13$  G.

The values of the effective temperature and radius as measured by a distant observer ("values at infinity") are

$$T_{\text{eff}}^{\text{Inf}} = g_{\text{r}} * T_{\text{eff}}$$

$$R_{\text{ns}}^{\text{Inf}} = R_{\text{ns}} / g_{\text{r}}$$

where

$$g_{\text{r}} = (1 - 2.952 * M_{\text{ns}} / R_{\text{ns}})^{0.5}$$

### xsnsa Parameters

Number	Name	Description
1	LogT_eff	(unredshifted) effective temperature
2	M_ns	neutron star gravitational mass (in units of solar mass)
3	R_ns	neutron star radius (in km)

4	MagField	neutron star magnetic field (0, 1e12, or 1e13 G)
5	K	1/D <sup>2</sup> , where D is the distance of the object in pc.

If you publish results obtained using this model, please reference Pavlov et al. (1992, MNRAS 253, 193) and Zavlin et al. (1996, A&A 315, 141).

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](#), [steph1d](#), [steplo1d](#), [tan](#), [tpsf](#), [tpsf1d](#), [usermodel](#), [xs](#), [xsabsori](#), [xsacisabs](#), [xsapec](#), [xsbapec](#), [xsbody](#), [xsbodyrad](#), [xsboxray](#), [xsboxriv](#), [xsbnkpower](#), [xsbmc](#), [xsbremss](#), [xsbvapec](#), [xsc6mekl](#), [xsc6pmekl](#), [xsc6pvmkl](#), [xsc6vmekl](#), [xscabs](#), [xscemekl](#), [xscevmkl](#), [xscflow](#), [xscompbb](#), [xscompls](#), [xscompst](#), [xscomptt](#), [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](#), [xsnteea](#), [xspcfabs](#), [xspgpwrlw](#), [xspexray](#), [xspexriv](#), [xspfabs](#), [xsplabs](#), [xspcabs](#), [xsposm](#), [xspowerlaw](#), [xspshock](#), [xspwab](#), [xstraymond](#), [xsredder](#), [xsredg](#), [xsrefsch](#), [xssedov](#), [xssmedg](#), [xsspline](#), [xssrcut](#), [xssresc](#), [xssssice](#), [xsstep](#), [xstbabs](#), [xstbgrain](#), [xstbvarabs](#), [xsuvred](#), [xsvapec](#), [xsvarabs](#), [xsvbremss](#), [xsvequil](#), [xsvgnei](#), [xsvmcfow](#), [xsvmekal](#), [xsvmekal](#), [xsvnei](#), [xsvnpshock](#), [xsvphabs](#), [xsvpshock](#), [xsvraymond](#), [xsvsedov](#), [xswabs](#), [xswndabs](#), [xsxion](#), [xszbbody](#), [xszbremss](#), [xszedg](#), [xszgauss](#), [xszhighect](#), [xszpcfabs](#), [xszphabs](#), [xszpowerlw](#), [xsztbabs](#), [xszvarabs](#), [xszvfeabs](#), [xszvphabs](#), [xszwabs](#), [xszwndabs](#)

### *slang*

[usermodel](#)

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URL:  
<http://cxc.harvard.edu/ciao3.4/xsnsa.html>  
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