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*AHELP for CIAO 3.4*

## fpsf1d

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## Synopsis

A 1-D file-based PSF instrument model.

## Description

FPSF1D is a file-based PSF model that represents the point-spread function, a redistribution function that maps photon locations to data bins.

This model cannot be used in a source model expression. See PTSRC1D model if you want to fit the data with the PSF model file.

ASCII and FITS formats are allowed for the input model file. The current implementation requires that the bin size of the data and the PSF model file are the same. The number of bins can be different.

Note that the input file is automatically renormalized to 1 upon entry. Renormalization is done by summing over all bins, regardless of the setting of `xsize`.

The input PSF array is used to convolve (fold) a given source model. This convolution can be performed using either Fast Fourier Transforms (FFTs, the default), or the sliding cell technique (see the parameter `fft`). If the axis length is  $N$  and the length of the kernel axis is  $M (= 2 * xsize + 1)$ , then the computation time for the sliding cell goes as  $N * M$ , i.e., for large kernels the best choice is using the FFT. A rough rule-of-thumb for 1-D fits is to use the FFT if  $M > 10$ .

"`xsize`" parameter defines the number of bins extracted from the file to be used in the PSF model.

`xoff = 0`, the PSF (kernel) sub-array is extracted from the center of the original array contained in the input PSF file.

Note that the kernel centroid must always be at the center of the extracted sub-array! Otherwise, systematic shifts will occur in best-fit positions of point sources.

In Sherpa version 3.0.2, a new parameter is introduced: `radial`. If set to 1 the kernel array will be extended and its values reflected across the edge boundary. The resultant function will be symmetric. The default value is 0.

See the documentation on the INSTRUMENT command.

## FPSF1D Parameters

Number	Name	Description
1	file	input file name (FITS or ASCII)
2	xsize	x–full–width of the subset region of kernel file to use in convolution
3	xoff	x–direction offset
4	fft	convolution type: 1 = FFT / 0 = sliding cell
5	radial	radial profile: 1 = yes / 0 = no

## Example

The example below shows the initial parameter values for the FPSF1D model. Note that the default xsize value is set to 32 before the PSF data file is read in. After reading the data file the xsize is set to the size of the array in the model file.

```

sherpa> fpsf1d[psf0]
sherpa> show psf0
fpsf1d[psf0]
  Param  Type      Value      Min      Max      Units
  -----
  1  file string: "none"
  2  xsize frozen      32        1     1024
  3  xoff frozen       0     -512     512
  4  fft  frozen       1         0         1
  5  radial frozen     0         0         1

sherpa> psf0.file=test_model.dat
sherpa> show psf0
fpsf1d[psf0]
  Param  Type      Value      Min      Max      Units
  -----
  1  file string: "test_model.dat"
  2  xsize frozen      38         1         38
  3  xoff frozen       0     -19     19
  4  fft  frozen       1         0         1
  5  radial frozen     0         0         1

sherpa> instrument = psf0

```

## Bugs

See the [Sherpa bug pages](#) online for an up–to–date listing of known bugs.

## See Also

*sherpa*

[atten](#), [bbody](#), [bbodyfreq](#), [beta1d](#), [beta2d](#), [box1d](#), [box2d](#), [bpl1d](#), [const1d](#), [const2d](#), [cos](#), [delta1d](#), [delta2d](#), [dered](#), [devaucouleurs](#), [edge](#), [erf](#), [erfc](#), [farf](#), [farf2d](#), [fpsf](#), [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](#),

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[xsbextrav](#), [xsbextriv](#), [xsbknpower](#), [xsbmc](#), [xsbremss](#), [xsbvapec](#), [xsc6mekl](#), [xsc6pmekl](#), [xsc6pvmkl](#),  
[xsc6vmekl](#), [xscabs](#), [xscemekl](#), [xscevmkl](#), [xscflow](#), [xscmpbb](#), [xscmpls](#), [xscmpst](#), [xscmpptt](#), [xsconstant](#),  
[xscutoffpl](#), [xscyclabs](#), [xsdisk](#), [xsdiskbb](#), [xsdiskline](#), [xsdiskm](#), [xsdisko](#), [xsdiskpn](#), [xsdust](#), [xsedge](#), [xsequil](#),  
[xsexpabs](#), [xsexpdec](#), [xsexpfac](#), [xsgabs](#), [xsgaussian](#), [xsgnei](#), [xsgrad](#), [xsgrbm](#), [xshighcut](#), [xshrefl](#), [xslaor](#),  
[xslorentz](#), [xsmeka](#), [xsmekal](#), [xsmkcflow](#), [xsnei](#), [xsnotch](#), [xsnphock](#), [xsnsa](#), [xsnteea](#), [xspcfabs](#),  
[xspgpwrlw](#), [xspextrav](#), [xspextriv](#), [xsphabs](#), [xsplabs](#), [xsplcabs](#), [xspesm](#), [xspowerlaw](#), [xspshock](#), [xspwab](#),  
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[xstbabs](#), [xstbgrain](#), [xstbvarabs](#), [xsuvred](#), [xsvapec](#), [xsvarabs](#), [xsvbremss](#), [xsvequil](#), [xsvgnei](#), [xsvmcflow](#),  
[xsvmeka](#), [xsvmekal](#), [xsvnei](#), [xsvnpshock](#), [xsvphabs](#), [xsvpshock](#), [xsvraymond](#), [xsvsedov](#), [xswabs](#),  
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[xszpowerlw](#), [xsztbabs](#), [xszvarabs](#), [xszvfeabs](#), [xszvphabs](#), [xszwabs](#), [xszwndabs](#)

*slang*

[usermodel](#)

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<http://cxc.harvard.edu/ciao3.4/fpsf1d.html>  
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