



 AHELP for CIAO 3.4

pileup

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Synopsis

Defines the pileup model expression to be used for fitting a 1D dataset.

Syntax

```
sherpa> PILEUP [<dataset range> | ALLSETS] = <pileupModelExpr>

<dataset range> = # (or more generally #:#,#:#, etc.) such that #
specifies a dataset number and #:# represents an inclusive range of
datasets; one may specify multiple inclusive ranges by separating them
with commas. The default dataset is dataset 1.
```

Description

In CIAO 3.0 Sherpa, there is one pileup model available: JDPILEUP, developed by John Davis at MIT. The pileup model does not work for pileup in dispersed spectra. Rather, the model was designed for imaging pileup, including pileup by the gratings in zeroth order. This model is used for fitting energy spectra only.

Note that:

- To apply the JDPILEUP model, an instrument model with ARF must be defined, and the ARF must have a uniform grid.
- The parameters of the JDPILEUP model (in particular, alpha) themselves do not indicate how much pileup occurred during the observation. To retrieve this information, use the command SHOW PILEUP, based on the PRINT_KERNEL function of the fitting application ISIS. See the example below for an explanation of the output of SHOW PILEUP.
- By default, if the model instance of JDPILEUP has not previously been established, Sherpa will prompt for its initial parameter values. This prompting can be turned off using the PARAMPROMPT OFF command.

To reset the pileup model stack, issue the command:

```
sherpa> PILEUP [<dataset range> | ALLSETS] =
```

Example 1

Define a pileup model for use:

```

sherpa> DATA data/source.pi
The inferred file type is PHA.  If this is not what you want, please
specify the type explicitly in the data command.
WARNING: statistical errors specified in the PHA file.
        These are currently IGNORED.  To use them, type:
        READ ERRORS "<filename>[cols CHANNEL,STAT_ERR]" fitsbin
sherpa> PARAMPROMPT OFF
Model parameter prompting is off
sherpa> INSTRUMENT = RSP[myinst]("data/source.rmf", "data/source.arf")
The inferred file type is ARF.  If this is not what you want, please
specify the type explicitly in the data command.
sherpa> POW[p]
sherpa> SOURCE = p
sherpa> JDPILEUP[jdp]
sherpa> PILEUP = jdp
sherpa> FIT

```

In this example, data is input and a power-law model component is established and then defined as the source model for fitting. The command JDPILEUP[jdp] establishes the JDPILEUP model component and assigns it the name jdp. The command PILEUP = jdp then defines this pileup model for use in fitting.

Example 2

After fitting, display the pileup fractions with SHOW PILEUP:

```

sherpa> SHOW PILEUP
 1: 0.224696  0.541445
 2: 0.263513  0.304025
 3: 0.206024  0.113808
 4: 0.120808  0.031952
 5: 0.0566711 0.00717652
 6: 0.0221538 0.00134322
 7: 0.00742312 0.000215494
 8: 0.00217637 3.02503e-05
 9: 0.000567189 3.77462e-06
10: 0.000133035 4.23895e-07
*** pileup fraction: 0.458555

```

Each row represents the number of photons per CCD frame. The maximum number of rows is 20; here, there were no more than 10 photons piled together per frame. The left column represents the percentage of frames with the stated number of photons: here, 22.47% of frames contained a single photon, 26.35% contained two photons piled together, etc. The right column indicates the percentage of observed counts with the stated number of photons: here, 54.14% of recorded counts were comprised of one photon, etc.. The total pileup fraction is the sum of the right column, excluding the first row: here, 45.85% of observed counts actually contain two or more photons piled together.

Bugs

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

See Also

sherpa

[autoest](#), [background](#), [create](#), [create_model](#), [createparamset](#), [fit](#), [freeze](#), [get_defined_models](#),
[get_model_params](#), [get_models](#), [get_num_par](#), [get_par](#), [get_stackexpr](#), [getx](#), [gety](#), [guess](#), [instrument](#),

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[integrate](#), [is_paramset](#), [jointmode](#), [kernel](#), [lineid](#), [linkparam](#), [mdl](#), [modeexpr](#), [modelstack](#),
[nestedmodel](#), [noise](#), [paramprompt](#), [paramset](#), [rename](#), [run_fit](#), [set_par](#), [set_paramset](#), [set_stackexpr](#),
[source](#), [thaw](#), [truncate](#), [unlink](#)

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