



AHELP for CIAO 3.4

## chigehrels

Context: [sherpa](#)

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## Synopsis

Chi-square statistic with the Gehrels variance function.

## Description

This is the Sherpa default statistic.

If the number of counts in each bin is small ( $< 5$ ), then we cannot assume that the Poisson distribution from which the counts are sampled has a nearly Gaussian shape. The standard deviation (i.e., the square-root of the variance) for this low-count case has been derived by Gehrels (1986):

$$\sigma(i,S) = 1 + (\text{sqrt})[N(i,S)+0.75] .$$

Higher-order terms have been dropped from the expression; it is accurate to approximately one percent. If one does not perform background subtraction, then  $\sigma(i) = \sigma(i,S)$ ; otherwise, one may use standard error propagation to estimate that

$$\sigma(i)^2 = \sigma(i,S)^2 + [A(S)/A(B)]^2 \sigma(i,B)^2 .$$

The background term appears only if a background region is specified and background subtraction is done. See CHISQUARE for more information, including definitions of the quantities shown above.

## Note on Background Subtraction

We have not determined the accuracy of the latter expression, thus the user should proceed with caution when subtracting background from the raw data when using this statistic. An approach preferable to background subtraction is to model the background and data simultaneously.

## Example

Specify the fitting statistic and then confirm it has been set.

```
sherpa> STATISTIC CHI GEHRELS
sherpa> SHOW STATISTIC
Statistic:           Chi-Squared Gehrels
```

## Bugs

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

## See Also

*sherpa*

[bayes](#), [cash](#), [chicvar](#), [chidvar](#), [chimvar](#), [chiprimini](#), [chisquare](#), [cstat](#), [get\\_stat\\_expr](#), [statistic](#), [truncate](#),  
[userstat](#)

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