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CIAO 2.1.2 Release Notes

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Sherpa

```
− Changes to Optimization Methods resulted in a factor of 2−3 speedup for
  LEVENBERG−MARQUARDT alone, with speedups of up to an order of magnitude
  possible, depending on the circumstances of the fit.  Here are the
  details:

     * The RMF convolution function has been rewritten to reduce
       execution time.  (This helps reduce the time−to−convergence
       for *all* optimization methods, not just LEVENBERG−MARQUARDT.)

     * The LEVENBERG−MARQUARDT function has been rewritten to reduce
       execution time, with unnecessary model evaluations removed.

     * LEVENBERG−MARQUARDT has three new parameters: smplx, smplxep,
       and smplxit.  If smplx = 1, the LM fit is "refined" with a
       Simplex fit (the default value for smplx is 0).  Simplex refinement
       can be useful for complicated fitting problems where straight
       LM does not provide a quick solution.  Switchover from LM to
       simplex occurs when delta(stat) from one iteration to the next is
       less than lev−mar.smplxep, for lev−mar.smplxit iterations in a row.
       For example, the default is for switchover to occur when
       delta chi**2 < 1 for 3 iterations in a row.

     * The convergence criterion algorithm for SIMPLEX was altered so
       as to reduce the number of iterations needed for a fit.

     * A thread describing the simplex refinement of a lev−marq fit
       is available at

       http://cxc.harvard.edu/ciao/threads/sherpa.levmar.html

− Changes to I/O

     * The user can specify parameter step sizes using the DELTA parameter.
       Step sizes are used by the optimization methods to determine where
       to sample parameter space: if the value of a parameter is known well
       (such as would be the case with a line centroid energy), specifying
       a small delta may lead to a substantially faster and better fit than
       using the default value (which is 1% of the parameter value).

       The user may specify delta

       a) at the model parameter value prompt:
              gem1.LineE [0.5] 0.552:0.548:0.554:1.e−5
                               init  min   max   delta

       b) on the command−line with other model parameter values:
              sherpa> gem1.LineE = 0.552:0.548:0.554:1.e−5
                                   init  min   max   delta

       c) directly:
```

```
            sherpa> gem1.LineE.delta = 1.e−5

      * The delta function in one−dimension can no longer be specified as
        either DELTA or DELTA1D, but only as DELTA1D.
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dmextract

```
        − Fixed problem when region exented beyond the edge of field.
          Currently, counts will be correctly counted; however, the
          area computation is still incorrect. [5479]
        − Users can now extract radial profiles from images whose
          pixel values are not integers.  For example, users trying to
          create radial profile from mkpsf output were getting
          incorrect results [5490]
        − Restored support for the PHA_MIN/PHA_MAX columns which were
          inadvertently removed from the type I PHA file
          output. [5537]
        − Dmextract was weighting the images by the binning factor.
          This was not the correct calculation due to the nature of
          the exposure maps. Now the weighted maps are weighted by
          the number of pixels instead of the area.[5538]
        − When exposure maps were being used, the area would
          incorrectly be computed (different from above).[5585]

        − Known Issue: A current limitation in dmextract fails to account
          for regions and x,y subspaces defined in the input file. This
          limitation also does not account for excluded regions in the
          input file.  It will be fixed in CIAO 2.2. [bug 5475]"
```

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