Release notes for ENDF/B Development photoat-040_Zr_000 evaluation

October 13, 2016

- `checkr` Warnings:

  1. A previous error halted parsing of the current section
     MAT=4000, MF= 1, MT=451 (1): Parsing stopped

     ```
     ERROR(S) FOUND IN MAT=4000, MF= 1, MT=451
        SECTION CANNOT BE CHECKED FROM SEQUENCE NUMBER      158 TO     185
     ```

- `checkr` Errors:

  1. A variable is outside the allowed ENDF range
     MAT=4000, MF= 1, MT=451 (0): Variable range

     ```
     ERROR(S) FOUND IN MAT=4000, MF= 1, MT=451
        MOD =     3 OUT OF RANGE     0 -     1           RECORD NUMBER     158
     ```

  2. Missing a section in directory so your directory is messed up. This error will break everything else
     MAT=4000, MF=23, MT=501 (0): Directory (b)

     ```
     ERROR(S) FOUND IN MAT=4000, MF=23, MT=501
        SECTION 23/501 NOT IN DIRECTORY                 RECORD NUMBER     187
     ```

  3. Missing a section in directory so your directory is messed up. This error will break everything else
     MAT=4000, MF=23, MT=502 (0): Directory (b)

     ```
     ERROR(S) FOUND IN MAT=4000, MF=23, MT=502
        SECTION 23/502 NOT IN DIRECTORY                 RECORD NUMBER     945
     ```

  4. Missing a section in directory so your directory is messed up. This error will break everything else
     MAT=4000, MF=23, MT=504 (0): Directory (b)

     ```
     ERROR(S) FOUND IN MAT=4000, MF=23, MT=504
        SECTION 23/504 NOT IN DIRECTORY                 RECORD NUMBER    1255
     ```

  5. Missing a section in directory so your directory is messed up. This error will break everything else
     MAT=4000, MF=23, MT=515 (0): Directory (b)

     ```
     ERROR(S) FOUND IN MAT=4000, MF=23, MT=515
        SECTION 23/515 NOT IN DIRECTORY                 RECORD NUMBER    1296
     ```

  6. Missing a section in directory so your directory is messed up. This error will break everything else
     MAT=4000, MF=23, MT=516 (0): Directory (b)

     ```
     ERROR(S) FOUND IN MAT=4000, MF=23, MT=516
        SECTION 23/516 NOT IN DIRECTORY                 RECORD NUMBER    1330
     ```

  7. Missing a section in directory so your directory is messed up. This error will break everything else
     MAT=4000, MF=23, MT=517 (0): Directory (b)

```
ERROR(S) FOUND IN MAT=4000, MF=23, MT=517
   SECTION 23/517 NOT IN DIRECTORY                  RECORD NUMBER    1382
```

8. Missing a section in directory so your directory is messed up. This error will break everything else
   MAT=4000, MF=23, MT=522 (0): Directory (b)

```
ERROR(S) FOUND IN MAT=4000, MF=23, MT=522
   SECTION 23/522 NOT IN DIRECTORY                  RECORD NUMBER    1422
```

9. Missing a section in directory so your directory is messed up. This error will break everything else
   MAT=4000, MF=23, MT=534 (0): Directory (b)

```
ERROR(S) FOUND IN MAT=4000, MF=23, MT=534
   SECTION 23/534 NOT IN DIRECTORY                  RECORD NUMBER    1811
```

10. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4000, MF=23, MT=535 (0): Directory (b)

```
ERROR(S) FOUND IN MAT=4000, MF=23, MT=535
   SECTION 23/535 NOT IN DIRECTORY                  RECORD NUMBER    1834
```

11. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4000, MF=23, MT=536 (0): Directory (b)

```
ERROR(S) FOUND IN MAT=4000, MF=23, MT=536
   SECTION 23/536 NOT IN DIRECTORY                  RECORD NUMBER    1861
```

12. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4000, MF=23, MT=537 (0): Directory (b)

```
ERROR(S) FOUND IN MAT=4000, MF=23, MT=537
   SECTION 23/537 NOT IN DIRECTORY                  RECORD NUMBER    1889
```

13. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4000, MF=23, MT=538 (0): Directory (b)

```
ERROR(S) FOUND IN MAT=4000, MF=23, MT=538
   SECTION 23/538 NOT IN DIRECTORY                  RECORD NUMBER    1917
```

14. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4000, MF=23, MT=539 (0): Directory (b)

```
ERROR(S) FOUND IN MAT=4000, MF=23, MT=539
   SECTION 23/539 NOT IN DIRECTORY                  RECORD NUMBER    1947
```

15. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4000, MF=23, MT=540 (0): Directory (b)

```
ERROR(S) FOUND IN MAT=4000, MF=23, MT=540
   SECTION 23/540 NOT IN DIRECTORY                  RECORD NUMBER    1983
```

16. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4000, MF=23, MT=541 (0): Directory (b)

```
ERROR(S) FOUND IN MAT=4000, MF=23, MT=541
   SECTION 23/541 NOT IN DIRECTORY                  RECORD NUMBER    2020
```

17. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4000, MF=23, MT=542 (0): Directory (b)

```
ERROR(S) FOUND IN MAT=4000, MF=23, MT=542
   SECTION 23/542 NOT IN DIRECTORY                  RECORD NUMBER    2074
```

18. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4000, MF=23, MT=543 (0): Directory (b)

```
ERROR(S) FOUND IN MAT=4000, MF=23, MT=543
   SECTION 23/543 NOT IN DIRECTORY                  RECORD NUMBER    2128
```

19. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4000, MF=23, MT=544 (0): Directory (b)

```
ERROR(S) FOUND IN MAT=4000, MF=23, MT=544
   SECTION 23/544 NOT IN DIRECTORY                  RECORD NUMBER    2164
```

20. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4000, MF=23, MT=545 (0): Directory (b)

```
ERROR(S) FOUND IN MAT=4000, MF=23, MT=545
   SECTION 23/545 NOT IN DIRECTORY                  RECORD NUMBER    2211
```

21. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4000, MF=23, MT=546 (0): Directory (b)

```
ERROR(S) FOUND IN MAT=4000, MF=23, MT=546
   SECTION 23/546 NOT IN DIRECTORY                  RECORD NUMBER    2258
```

22. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4000, MF=23, MT=547 (0): Directory (b)

```
ERROR(S) FOUND IN MAT=4000, MF=23, MT=547
   SECTION 23/547 NOT IN DIRECTORY                  RECORD NUMBER    2330
```

23. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4000, MF=23, MT=550 (0): Directory (b)

```
ERROR(S) FOUND IN MAT=4000, MF=23, MT=550
   SECTION 23/550 NOT IN DIRECTORY                 RECORD NUMBER    2402
```

24. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4000, MF=27, MT=502 (0): Directory (b)

```
ERROR(S) FOUND IN MAT=4000, MF=27, MT=502
   SECTION 27/502 NOT IN DIRECTORY                 RECORD NUMBER    2464
```

25. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4000, MF=27, MT=504 (0): Directory (b)

```
ERROR(S) FOUND IN MAT=4000, MF=27, MT=504
   SECTION 27/504 NOT IN DIRECTORY                 RECORD NUMBER    2519
```

26. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4000, MF=27, MT=505 (0): Directory (b)

```
ERROR(S) FOUND IN MAT=4000, MF=27, MT=505
   SECTION 27/505 NOT IN DIRECTORY                 RECORD NUMBER    2576
```

27. Missing a section in directory so your directory is messed up. This error will break everything else
    MAT=4000, MF=27, MT=506 (0): Directory (b)

```
ERROR(S) FOUND IN MAT=4000, MF=27, MT=506
   SECTION 27/506 NOT IN DIRECTORY                 RECORD NUMBER    2726
```

- `fudge-4.0` Warnings:

  1. generic warning message
     reaction label 0: Zr + gamma [coherent] / Product: gamma (Error # 0): Warning

     ```
     WARNING: coherentScattering is not a valid distribution component for 2-body reaction
     ```

  2. FIXME: Generic fudge unimplemented message
     reaction label 0: Zr + gamma [coherent] / Product: gamma (Error # 2): Generic unimp (c)

     ```
     WARNING: Checking not yet implemented for pointwise type data
     ```

  3. generic warning message
     reaction label 1: Zr + gamma [incoherent] / Product: gamma (Error # 0): Warning

     ```
     WARNING: incoherentScattering is not a valid distribution component for 2-body reaction
     ```

  4. FIXME: Generic fudge unimplemented message
     reaction label 1: Zr + gamma [incoherent] / Product: gamma (Error # 2): Generic unimp (c)

     ```
     WARNING: Checking not yet implemented for piecewise type data
     ```

5. Cross sections do not correctly sum up properly according to an ENDF (or equivalent) sumrule
   summedReaction label 19: total (Error # 0): Sumrule

   ```
   WARNING: Cross section does not match sum of linked reaction cross sections! Max diff: 100.00%
   ```

6. Cross sections do not correctly sum up properly according to an ENDF (or equivalent) sumrule
   summedReaction label 21: photoelectric absorption (Error # 0): Sumrule

   ```
   WARNING: Cross section does not match sum of linked reaction cross sections! Max diff: 74.29%
   ```

- `fudge-4.0` Errors:

1. Calculated and tabulated thresholds don't agree
   reaction label 0: Zr + gamma [coherent] / Cross section: (Error # 0): Threshold mismatch

   ```
   WARNING: Calculated and tabulated thresholds disagree: 1.e-5 eV vs 1. eV!
   ```

2. 2-body reaction not in center-of-mass frame
   reaction label 0: Zr + gamma [coherent] / Product: gamma (Error # 1): 2-body not in COM

   ```
   WARNING: 2-body reaction not in center-of-mass frame!
   ```

3. Calculated and tabulated thresholds don't agree
   reaction label 1: Zr + gamma [incoherent] / Cross section: (Error # 0): Threshold mismatch

   ```
   WARNING: Calculated and tabulated thresholds disagree: 1.e-5 eV vs 1. eV!
   ```

4. 2-body reaction not in center-of-mass frame
   reaction label 1: Zr + gamma [incoherent] / Product: gamma (Error # 1): 2-body not in COM

   ```
   WARNING: 2-body reaction not in center-of-mass frame!
   ```

5. Energy range of data set does not match cross section range
   reaction label 1: Zr + gamma [incoherent] / Product: gamma / Distribution incoherentScattering - piecewise: (Error # 0): Domain mismatch (a)

   ```
   WARNING: Domain doesn't match the cross section domain: (0.0 -> 1000000000.0) vs (1.0 -> 1e+11)
   ```

6. Calculated and tabulated thresholds don't agree
   reaction label 2: e- + e+ + Zr [electron field] / Cross section: (Error # 0): Threshold mismatch

   ```
   WARNING: Calculated and tabulated thresholds disagree: 1.e-5 eV vs 2.044e6 eV!
   ```

7. Calculated and tabulated thresholds don't agree
   reaction label 3: e- + e+ + Zr [nuclear field] / Cross section: (Error # 0): Threshold mismatch

   ```
   WARNING: Calculated and tabulated thresholds disagree: 1.e-5 eV vs 1.022e6 eV!
   ```

8. Calculated and tabulated thresholds don't agree
   reaction label 4: e- + Zr1s1/2 / Cross section: (Error # 0): Threshold mismatch

   ```
   WARNING: Calculated and tabulated thresholds disagree: 1.e-5 eV vs 17962. eV!
   ```

9. Calculated and tabulated thresholds don't agree
   reaction label 5: e- + Zr2s1/2 / Cross section: (Error # 0): Threshold mismatch

   ```
   WARNING: Calculated and tabulated thresholds disagree: 1.e-5 eV vs 2514.6 eV!
   ```

10. Calculated and tabulated thresholds don't agree
    reaction label 6: e- + Zr2p1/2 / Cross section: (Error # 0): Threshold mismatch

    ```
    WARNING: Calculated and tabulated thresholds disagree: 1.e-5 eV vs 2312.2 eV!
    ```

11. Calculated and tabulated thresholds don't agree
    reaction label 7: e- + Zr2p3/2 / Cross section: (Error # 0): Threshold mismatch

    ```
    WARNING: Calculated and tabulated thresholds disagree: 1.e-5 eV vs 2224.8 eV!
    ```

12. Calculated and tabulated thresholds don't agree
    reaction label 8: e- + Zr3s1/2 / Cross section: (Error # 0): Threshold mismatch

    ```
    WARNING: Calculated and tabulated thresholds disagree: 1.e-5 eV vs 422.06 eV!
    ```

13. Calculated and tabulated thresholds don't agree
    reaction label 9: e- + Zr3p1/2 / Cross section: (Error # 0): Threshold mismatch

    ```
    WARNING: Calculated and tabulated thresholds disagree: 1.e-5 eV vs 344.93 eV!
    ```

14. Calculated and tabulated thresholds don't agree
    reaction label 10: e- + Zr3p3/2 / Cross section: (Error # 0): Threshold mismatch

    ```
    WARNING: Calculated and tabulated thresholds disagree: 1.e-5 eV vs 330.88 eV!
    ```

15. Calculated and tabulated thresholds don't agree
    reaction label 11: e- + Zr3d3/2 / Cross section: (Error # 0): Threshold mismatch

    ```
    WARNING: Calculated and tabulated thresholds disagree: 1.e-5 eV vs 193.09 eV!
    ```

16. Calculated and tabulated thresholds don't agree
    reaction label 12: e- + Zr3d5/2 / Cross section: (Error # 0): Threshold mismatch

    ```
    WARNING: Calculated and tabulated thresholds disagree: 1.e-5 eV vs 190.49 eV!
    ```

17. Calculated and tabulated thresholds don't agree
    reaction label 13: e- + Zr4s1/2 / Cross section: (Error # 0): Threshold mismatch

    ```
    WARNING: Calculated and tabulated thresholds disagree: 1.e-5 eV vs 59.96 eV!
    ```

18. Calculated and tabulated thresholds don't agree
    reaction label 14: e- + Zr4p1/2 / Cross section: (Error # 0): Threshold mismatch

    ```
    WARNING: Calculated and tabulated thresholds disagree: 1.e-5 eV vs 38.63 eV!
    ```

19. Calculated and tabulated thresholds don't agree
    reaction label 15: e- + Zr4p3/2 / Cross section: (Error # 0): Threshold mismatch

    ```
    WARNING: Calculated and tabulated thresholds disagree: 1.e-5 eV vs 36.74 eV!
    ```

20. Calculated and tabulated thresholds don't agree
    reaction label 16: e- + Zr4d3/2 / Cross section: (Error # 0): Threshold mismatch

    ```
    WARNING: Calculated and tabulated thresholds disagree: 1.e-5 eV vs 6.67 eV!
    ```

21. Calculated and tabulated thresholds don't agree
    reaction label 17: e- + Zr4d5/2 / Cross section: (Error # 0): Threshold mismatch

    ```
    WARNING: Calculated and tabulated thresholds disagree: 1.e-5 eV vs 6.52 eV!
    ```

22. Calculated and tabulated thresholds don't agree
    reaction label 18: e- + Zr5s1/2 / Cross section: (Error # 0): Threshold mismatch

    ```
    WARNING: Calculated and tabulated thresholds disagree: 1.e-5 eV vs 6.12 eV!
    ```

23. Calculated and tabulated thresholds don't agree
    summedReaction label 19: total / Cross section: (Error # 0): Threshold mismatch

    ```
    WARNING: Calculated and tabulated thresholds disagree: 1.e-5 eV vs 1. eV!
    ```

24. Calculated and tabulated thresholds don't agree
    summedReaction label 20: pair product / Cross section: (Error # 0): Threshold mismatch

    ```
    WARNING: Calculated and tabulated thresholds disagree: 1.e-5 eV vs 1.022e6 eV!
    ```

25. Calculated and tabulated thresholds don't agree
    summedReaction label 21: photoelectric absorption / Cross section: (Error # 0): Threshold mismatch

    ```
    WARNING: Calculated and tabulated thresholds disagree: 1.e-5 eV vs 6.12 eV!
    ```

- `xsectplotter` Warnings:

  1. Encountered runtime warning in xsectplotter or Fudge or matplotlib
     Error: RuntimeWarning

     ```
     stderr while processing crossSection

     /usr/local/lib/python2.7/site-packages/matplotlib-1.3.1-py2.7-linux-x86_64.egg/matplotlib/pyplot.py:412: Runtime
     ... [3 more lines]
     ```