

Lt. Quartemont,

Question 1: is there a way to parallelize on particles for MAVRIC?

Yes – many folks run MAVRIC using “poor-man’s parallel”. You do one run that just calculates the importance map (no MC histories). Then you make a second input that uses the adjoint fluxes and does the Monte Carlo part. For poor-man’s parallel, you make several copies (8, 16, etc) of the second input but use a different random number seed in each one (parameters block, keyword `randomSeed=`).

Once all of the different Monte Carlos are done, you can combine the results (take the average) and their uncertainties in a spreadsheet (just use standard propagation of errors). If the different runs use different numbers of histories, you need to work that into the math. Let me know and I can provide more help on that.

Question 2: Lost particles

The geometry errors that say

```
volume has been multiply defined
  is located inside the following regions in the unit:
    8 T
    9 T
```

means that the tracking routines think a particle is in both regions at the same time. So the shared surface seems to be a problem.

In your geometry, perhaps you need to subtract one from the other, just to make sure the boundary between the two discs only belongs to one disc (in a similar manner to how you did the ones in [blue](#)). Below are some surfaces to add (in [red](#)) that may help the tracking by defining media region to not include their neighbor.

```
' 4 Tungsten Foil - Note numbering is off now.
    zCylinder 800 2.500 29.76 29.66
    media 18 1 800 vol=1.963495408
' 5 Zr Foil
    zCylinder 508 2.500 29.86 29.76
    media 3 1 508 -800 vol=1.963495408
' 6 Ni Foil
    zCylinder 509 2.500 29.96 29.86
    media 4 1 509 -508 vol=1.963495408
' 7 In Foil
    zCylinder 510 2.500 30.06 29.96
    media 5 1 510 -509 vol=1.963495408
' 8 Al Foil
    zCylinder 511 2.004 30.11254 30.11
    media 6 1 511 vol=0.032046383
' 9 Au Foil
    zCylinder 512 2.004 30.13794 30.11254
    media 8 1 512 -511 vol=0.320463834
' 10 Al Foil 2
    zCylinder 513 2.004 30.14048 30.13794
    media 6 1 513 -512 vol=0.032046383
' 11 HEU Foil
    zCylinder 514 -513 2.004 30.14556 30.14048
    media 9 1 514 vol=0.064092767
' 12 Al Foil 3
    zCylinder 515 2.004 30.1481 30.14556
```

```

media 6 1 515 -514 vol=0.032046383
' 13 Target Option Activation Device TOAD
zCylinder 516 2.500 30.263 30.06
media 1 1 516 -510 -511 -512 -513 -514 -515 -800
' 14 Al Foil 4
zCylinder 517 2.500 30.363 30.263
media 6 1 517 -516 vol=1.963495408
' 15 Neutron activation spectrometer
zCylinder 519 2.654 30.513 29.62
media 1 1 519 -508 -509 -510 -511 -513 -514 -515 -516 -517 -800

```

In the olden days of SCALE, users had to do this to make sure that surfaces were defined to be in one region or the other. When I joined SCALE, I complained bitterly about this, saying that it was an undue burden on the user. We came up with the strategy that if a particle is on a surface that belonged to two regions, it was “in” the region that its direction was heading. Then the users didn’t need to subtract a media region from its neighbors. For the most part, this works well and users are happy. But in some cases, the geometry still gets confused – probably a combination of a grazing angle across the plane and super thin regions where round-off becomes an issue. See if added the subtractions in red makes your geometry errors go away.

Another thing to consider: Since the region based on 519 already subtracts out 516, it may not need to subtract out 511, 513, 514, or 515, since they seem to be completely inside 516. Any particle outside of 516 is certainly outside of 511, 513, 514, and 515.

For

```

is located inside the following regions in the unit:
25 T
27 T

```

The problem is the shared surface between 531 and 534. Perhaps subtracting 531 would help here too.

```

' 27 Bi_4B
zCylinder 534 7.50 31.72 30.81 origin x=-0.3999
media 14 1 534 524 -531 vol=161.81

```

If these or other similar tracking errors persist, you can increase the number of lost particles before death occurs by using the keyword `maximumLost=1000` in the parameters block. Since you are trying to run billions of histories, losing 1000 wouldn’t really change the answer.

Hope this helps,  
Douglas