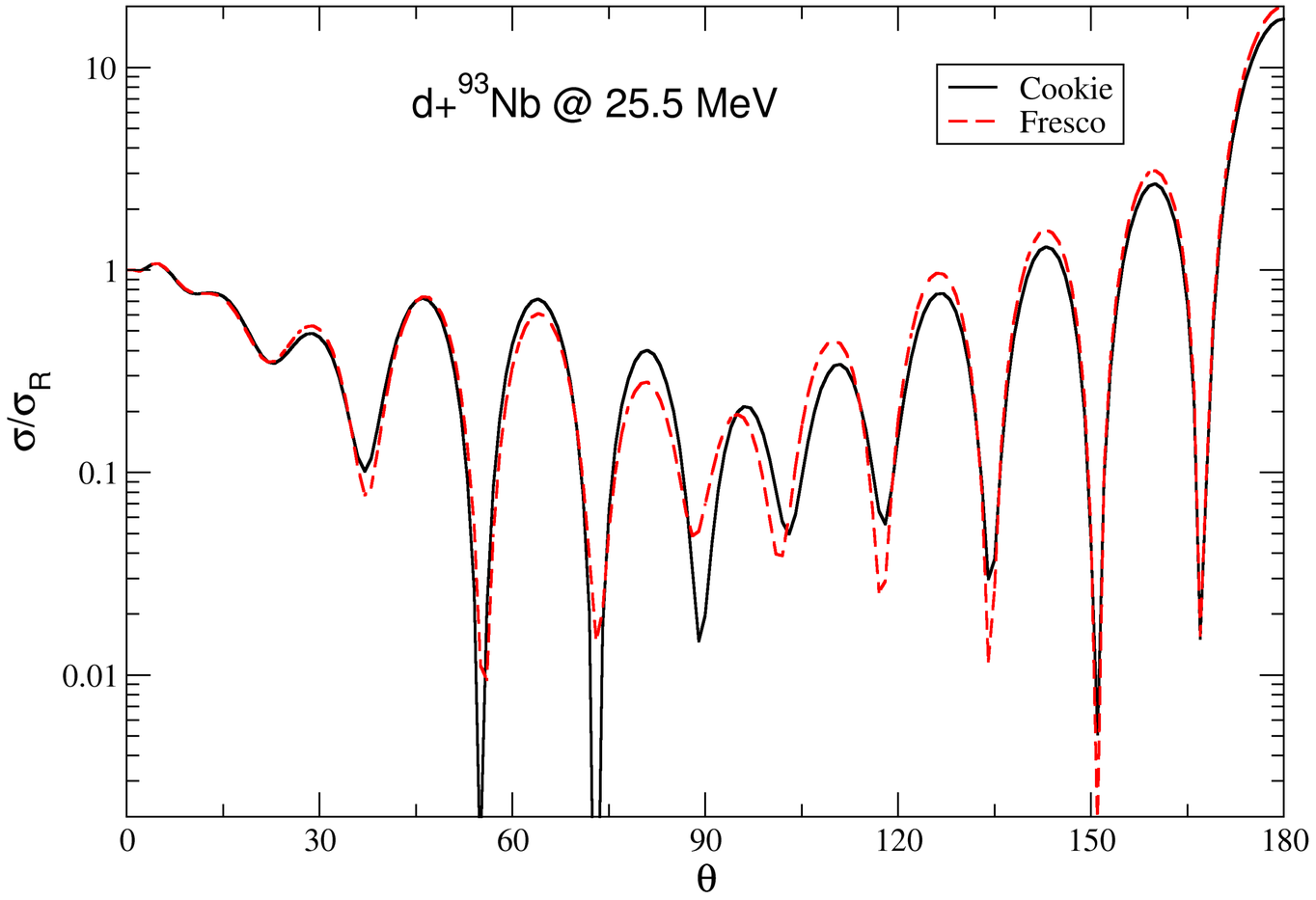
计算可观测量

Calculation

得到弹性散射截面，并与fresco的结果进行比较，形状符合的很好，但是依然存在一些差别，还在寻找原因。



Calculation

结果上Jeff的程序可以读入散射振幅，然后可以输出各种可观测量，其文件格式与fort.57中的格式是一致的。

```
d+ 150Sm at Ed=15.0 CDCC (no spins)
     15.0000  2.2250 20.9008  1.4400  0.0000 0  0.0000
  2.0141150.0000  1.0078  1.0063
     1.0    62.0     1.0     0.0
d       150Sm    p       Neutron
     0.0     0.0     0.0     0.0
       1       1       1       1
  42 100  42   5
 181  0.0000  1.0000
 0 0.0  0.0445  0.0049  0.0460 100   2   2
  3.1416  3.1416  3.1416  3.1416  3.1416  3.1040  3.1018  3.0995  3.0972  3.0951
  3.0927  3.0906  3.0883  3.0861  3.0839  3.0816  3.0794  3.0771  3.0749  3.0727
  3.0705  3.0682  3.0660  3.0638  3.0615  3.0593  3.0571  3.0549  3.0526  3.0504
  3.0482  3.0459  3.0437  3.0415  3.0392  3.0370  3.0348  3.0326  3.0303  3.0281
  3.0259  3.0237  3.0215  3.0192  3.0170  3.0148  3.0126  3.0104  3.0081  3.0059
  3.0037  3.0015  2.9993  2.9971  2.9948  2.9926  2.9904  2.9882  2.9860  2.9838
  2.9816  2.9794  2.9772  2.9750  2.9728  2.9706  2.9684  2.9662  2.9640  2.9618
  2.9596  2.9573  2.9552  2.9529  2.9508  2.9486  2.9464  2.9442  2.9420  2.9398
  2.9376  2.9354  2.9332  2.9310  2.9289  2.9267  2.9245  2.9223  2.9201  2.9179
  2.9158  2.9136  2.9114  2.9092  2.9071  2.9049  2.9027  2.9005  2.8984  2.8962
 0 0.0  0.2017  0.0460  0.0872 100   3   2
  2.8963  2.8941  2.8919  2.8898  2.8876  2.8854  2.8833  2.8811  2.8789  2.8768
  2.8746  2.8725  2.8703  2.8682  2.8660  2.8639  2.8617  2.8596  2.8574  2.8553
  2.8531  2.8510  2.8489  2.8467  2.8446  2.8424  2.8403  2.8382  2.8360  2.8339
  2.8318  2.8296  2.8275  2.8254  2.8233  2.8212  2.8190  2.8169  2.8148  2.8127
  2.8106  2.8085  2.8063  2.8042  2.8021  2.8000  2.7979  2.7958  2.7937  2.7916
  2.7895  2.7874  2.7853  2.7832  2.7811  2.7790  2.7770  2.7749  2.7728  2.7707
  2.7686  2.7665  2.7645  2.7624  2.7603  2.7582  2.7562  2.7541  2.7520  2.7500
  2.7479  2.7458  2.7438  2.7417  2.7396  2.7376  2.7355  2.7335  2.7314  2.7294
  2.7273  2.7253  2.7233  2.7212  2.7192  2.7171  2.7151  2.7131  2.7110  2.7090
  2.7070  2.7049  2.7029  2.7009  2.6989  2.6969  2.6948  2.6928  2.6908  2.6888
```

CDCC = 1

: Print out the $f(m'M' : mM;\theta)$ for each angle θ on file 57 for partition `PEL`, after the following information for *uncoupled* bin states:

```
line Y:(i2)  1    (indicating CDCC=1 format below)
line Z: (A120)   HEADNG from Fresco input.
line A: (F10.4,3F8.4)   ENLAB,Bproj,H2SM,e^2,Btarg,inp, (Qval if inp=1)
              lab energy,projectile binding energy, hbar^2/2.m, e^2,
              target binding energy,inp, Qval if inp=1

line B: (7f8.4)         massp,masst,massc,massv,massr
                                      masses: projectile,target,core,valence,residual
line C: (7f8.4)         Zp,Zt,Zc,Zv,Zr                charges
line D: (7A8)           namep,namet,namec,namev,namer names
line E: (7f8.1)         Jp,Jt,Jc,Jv,Jr                g.s. spins
line F: (7i8)           Pp,Pt,Pc,Pv,Pr                g.s. parities
   If inp=1, cards B-F (incl) have further #6 and #7 values
               for 'initial projectile' and 'initial target' too.

line G: (4I4)           NBINS,NKMAX,NEXB,NNJMAX no. CDCC bins, max NK,
                                                no. excited states, max(2*Jex+1)
line H: (I4,2f8.4)      NANGL,THMIN,THINC       (cm angular range from \&FRESCO)
for each of the NBINS bins:
 line I:(i2,2f4.1,3f8.4,2i4)
         l,j,Emid,kmin,kmax,NK,KN,ISC
            l,j: quantum numbers  (s==Jv)
            Emid:  centre of bin with respect to continuum threshold
            kmin,kmax,NK: Min,max and number of k values in bin integral
            KN:  original KN index for bin state
            ISC:  normalisation used for bin
     for each IK=1,NK
         line J: (10f8.4) delta(IK): nuclear phase shift used in bin integral (radians)

for each excited state pair in the entrance partition: IA=1,NEXB::
    line K: (f4.1,i4,f8.4,i4) Jex,Parity,Eex,IBIN:
            Jex :          spin of this projectile excited state  (not including core spin)
            Parity:        parity of this projectile state
            Eex:           excitation energy of this state above g.s.
            IBIN:          (first) bin defined for this excited state
    for each IANG=1,NANGL: read complex numbers:
    line L: (6E12.4): ((FAM(MEX,MP,IANG,IA),MEX=1,2*Jex(IA)+1),MP=1,2*Jp+1)
```

The phase convention for all CDCC values is that there is no Coulomb phase shift for $L = 0$ in the Coulomb scattering amplitude : factors such as $\exp i(\sigma_L - \sigma_0))$ appear in the A's.t

Calculation

目前在研究怎么输出对应的格式，并进行benchmark。

```
d+ 150Sm at Ed=15.0 CDCC (no spins)
     15.0000  2.2250 20.9008  1.4400  0.0000 0  0.0000
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            Parity:        parity of this projectile state
            Eex:           excitation energy of this state above g.s.
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    for each IANG=1,NANGL: read complex numbers:
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