IAEA-NDS-9
Rev. 0

INTERNATIONAL ATOMIC ENERGY AGENCY
NUCLEAR DATA SERVICES
DOCUMENTATION SERIES OF THE IAEA NUCLEAR DATA SECTION

42 pages

STAPRE AND SCAT2

STATISTICAL PREIQULIBRIUM AND OPTICAL NUCLEAR MODEL CODE

for Personal Computer IBM/AT

Abstract: This document describes the content of the diskettes with nuclear data production codes SCAT2 and STAPRE and the example data set for implementing and testing of these codes for personal computers IBM/AT, They are available on two diskettes, free of charge, upon request from the NEA Data Bank, Saclay, France.

V.G. Goulo
IAEA Nuclear Data Section

January 1988

IAEA NUCLEAR DATA SECTION, P.O. BOX 100, A-1400 VIENNA

STAPRE AND SCAT2
Statistical-Preequilibrium and Optical Nuclear Model Codes for Personal Computer IBM/AT

History

Nuclear model codes for the calculations of reaction cross sections, particle and gamma emission spectra are developed under the IAEA Coordinated Research Programme. These codes are used for evaluated nuclear data libraries updating and were presented at the Trieste ICTP Workshop on Applied Nuclear Theory and Nuclear Model Calculations (1984). Usually these codes are implemented for mainframe computers like IBM or VAX. To enable NDS customers without mainframe facilities to update their nuclear data base it was decided to convert codes SCAT2 [1] (optical mode code by O. Bersillion, Bruyères-le-Châtel) and STAPRE [2] (statistical- preequilibrium code of H. Uhl et al., IRK, Vienna) in order that they would operate on Personal Computers (PCs). There would still be restrictions on the speed of calculations, but with the rapid advances in the technology of personal computers, it would give customers, especially those from developing countries with limited resources, the facility to develop their own data base and participate in the IAEA nuclear data related projects.

Conversion of codes from the mainframce computer to PC

SCAT2 and STAPRE codes of the Trieste ICTP, 1984, were taken for the implementation for PC. They were transmitted to a 5.25 diskettes of PC IBM-3270 in Nuclear Data Section.

I. SCAT2 code implementation

1. Compiling, linking

DOS 3.2 and PROFORT 1.0 compiler [3] were used for compiling the codes. The main corrections were done for the following FORTRAN operators:

- DATA, BLOCK DATA
- using the main PROGRAM and SUBROUTINE operators
- FUNCTIONs
- input and output FORMAT
- using of external devices, like SCRATCH files for unformatted input/output

Linkng the code was done with the folloing message:

```
LINK   SCAT2,,CON,C:;
```

2. Running

An examples of a batch data file is

```
SET FORT6  = SCAT2.OUT
SET FORT7  = SCAT2.SC1
SET FORT11 = SCAT2.SC2
SET FORT12 = SCAT2.SC3
SCAT2 /R  41000 > SCAT2.LST < SCAT2.INP,
```

where

SCAT2 module is an execution file
SCAT2.SC are scratch files
SCAT2.LST is listing of the code running

Explanation of the numerical data in the input format of the code is presented in Appendix A.

Example of input data file is presented in Appendix B.

This example represents the calculation of transmission coefficient for the code STAPRE for the reaction cross section calculation of

n → Nb-93 → Nb-94 → Nb-93 (n-emission with competition of p,a and gamma processes)
→ Nb-92 (n-emission)
→ Nb-91 (n-emission)

3. Description of optical potential and optical model parameters

Optical model parameters were chosen from the International Nuclear Model and Code comparison on Pre-equilibrium Effects by NEA Data Bank of 1984 [4].

Definition of optical potential and values of parameters are given in the following table:

$V_{opt}(r) = -V_R f_R$		central real
$+ \left(\frac{h}{mc}\right) \frac{2V_{SO}}{r} \left(\frac{d}{dr} f_{SO}\right) \vec{l} * \vec{\sigma}$		spin - orbit
$+ \frac{Zze^2}{2R_c}\left[3 - \left(\frac{r}{R_c}\right)^2\right]$	for $r < R_C$	Coulomb
$\frac{Zze^2}{r}$	for $r > R_C$	
$- iW_V f_I$		imaginary volume
$+ i4a_I W_{SF} \left(\frac{d}{dr} f_I\right)$		imaginary surface

where $f_x = f(r,R_x,a_x) = [1 + \exp(r-R_x/a_x]^{-1}$

$R_x = r_x A^{1/3}$

$R = r'_x A + r''^{1/3}$ for heavier projectiles

r_c = Columb radius

Parameters	V_R MeV	r_R fm	a_R fm	W_{SF} MeV	r_I fm	a_I fm	V_{SO} MeV	r_{SO} fm	a_{SO} fm	r_C fm
Neutron	48.0-0.293E	1.27	0.66	9.6	1.27	0.47	7.2	1.27	0.66	-
Protons	53.3-0.55E+ 1/3 +0.4Z/A + +27(N-A)/A	1.25	0.65	13.5	1.25	0.47	7.5	1.25	0.65	1.25
Alpha	50.0	1.17	0.576	13.74 1.77	1.17	0.576 1.77	-	-	-	1.15

4. Running time

Projectile	Target	Number of energies	Running time
N	Nb-93	4	40"
P	Nb-93	4	60"
D	Nb-93	4	100"
T	Nb-93	4	115"
He-3	Nb-93	4	117"
He-4	Nb-93	4	120"

5. Precision of transmission coefficient calculations

In comparison with the calculation on the mainframe IBM-3081 calculations deviations in transmission calculations were 0.4% for the energy range till 5 MeV and up to 2% for 20 MeV.

II. Implementation of STAPRE code for PC

For the implementation of STAPRE the 1984 version used at ICTP Trieste Workshop was taken. It is described in the Proceedings of 1976 with the fission channel taken into account.

1. Compiling and linking

   For the compilation PROFORT and RMFORT compilers were used. The same operators were changed as in the case of SCAT2 code. For the linkage the following procedure was used:

```
LINK  STAPRE1 + STAPRE2 + ..., STAPRE,CON,C:ROFORT.LIB+RMFORT.LIB
```

2. Running code

   An example of a batch file for the STAPRE code

```
SET FORT1 = STAP.SC1
SET FORT2 = STAP.SC2
SET FORT3 = STAP.SC3
SET FORT4 = STAP.SC4
SET FORT7 = STAP.SC7
SET FORT8 = STAP.SC8
SET FORT9 = STAP.SC9
STAPRE  /R  41000 >  STAPRE.1ST  < STAPRE.INP
```

   As an example of the calculation we will consider the reaction described in the part devoted to code SCAT2, namely:

```
n → Nb-93 → Nb-94 → Nb-93 (n-emission with competition of p,a
                           and gamma processes)
                  → Nb-92 (n-emission)
                  → Nb-91 (n-emission)
```

   (n,n'),(n,2n), (n,3n) emission spectra were calculated using the code STAPRE with the following models [4]:

   1. The spherical optical model with the following parameters of potentials:

      Neutron - Lagrange potential (De LaRoche, 1975)
      Proton - Peray Potential (Peray, 1963)
      Alpha-particles - McFadden Potential (1966)

   2. The exciton model for pre-equilibrium decay with the following dependance of the internal transition matrix element M**2=K/A**3/E,K=230, taking into account the Pauli principle. The single particle state densities were derived from Fermi gas A-parameter with an energy shift. Nucleon emission rates were calculated according to Gadioli (1943), alpha-particle emission rates - according to Milazzo-Colli (1973) with alpha-particle cluster preformation factor 0.18.

3. The Hauser-Feshbach model for equilibrium decay with Fermi gas level density parameters from Dilg (1973). Parameters of level density and level scheme data are given in input data in accordance with the description code.

4. Gamma strength functions were taken on the base of Weiskopf model, experimental branching ratios for the Nb-93 isomer state cross sections were used from Van Heerden.

Description of the code input parameters is presented in Appendix C and taken from report IRK 76/01 by M. Uhl and B. Strohmaier [1].

The input file is described in Appendix D.

Running time for this variant is approximately three minutes per incident point of energy and example of output is presented in Appendix E.

The example of neutron emission spectrum for 14.5 MeV neutron incident energy in comparison with the experimental data and calculations is represented on Fig. 1.

Reference

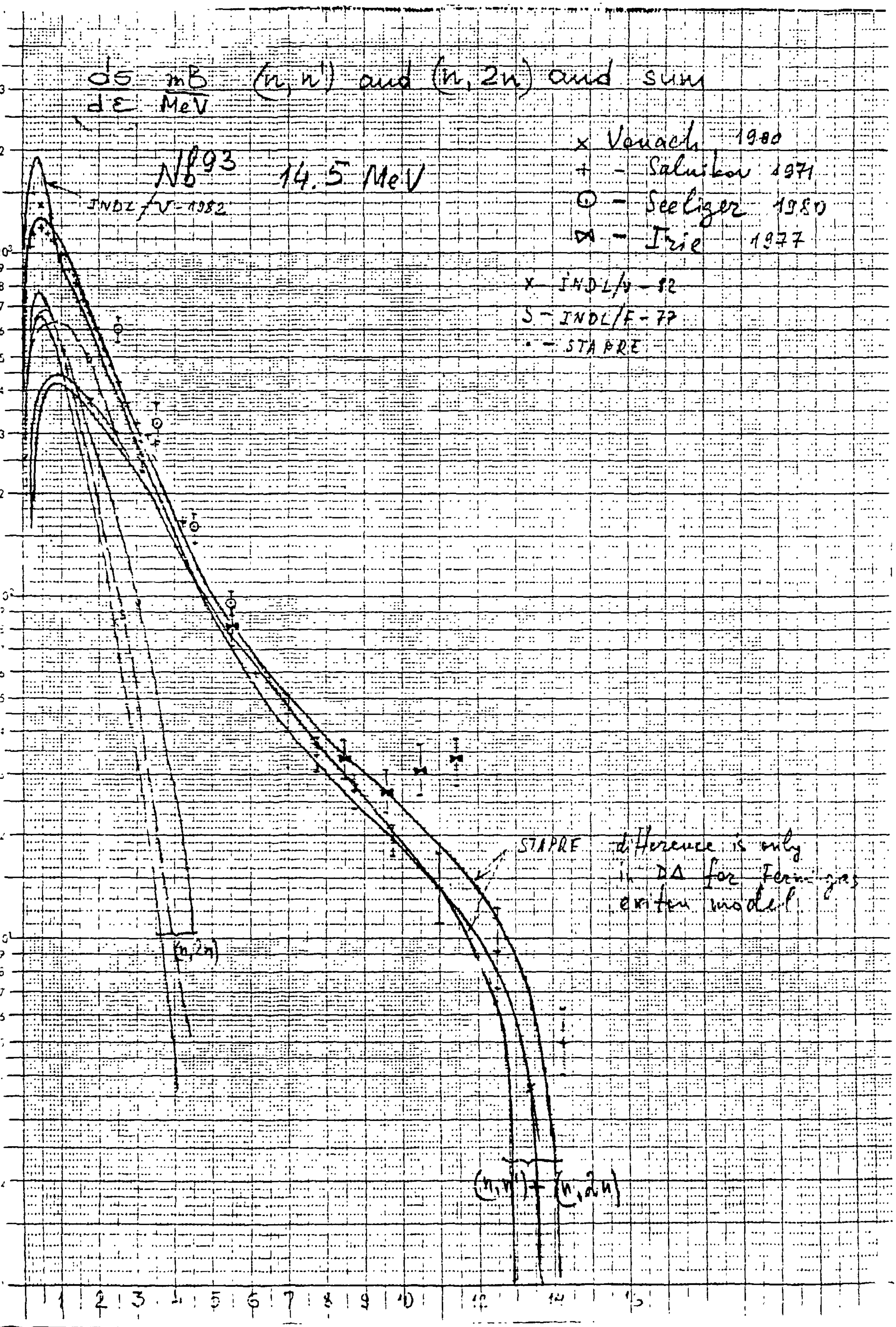
1. O. BERSILLON, SCAT2: Un Programme de Modele Optique Spherique, CEA-2227

2. M. UHL, B. STROHMAIER, STAPRE: A Computer Code for Particle Induced Activation Cross Sections and Related Quantities, IRK 76/01;

   B. STROHMAIER, Nuclear Model Calculations of Cross Sections for Neutron Induced Reactions on Nb-93 to 20 MeV, Ann. Nucl. Ener. V. 9, pp. 397-407, 1982

3. IBM Personal Computer Professional FORTRAN. Installation and Use, Ryan McFarland Corporation, 1984

4. H. GRUPPELAAR, H.A.J. VAN DER KAMP, P. NAGEL, International Nuclear Model and Code Intercomparison on Pre-equilibrium Effects, INDC(NDS)-152/L, 1984


dσ/dε mB/MeV (n,n') and (n,2n) and sum
Nb93 14.5 MeV
INDL/V-1982
x Vonach 1980
+ - Salnikov 1971
⊙ - Seeliger 1980
⋈ - Irie 1977
x - INDL/V-82
S - INDL/F-77
• - STAPRE
STAPRE difference is only in DΔ for Fermi-gas exciton model
(n,2n)
(n,n')+(n,2n)
1 2 3 4 5 6 7 8 9 10 12 14 15

APPENDIX A.

DESCRIPTION OF INPUT FORMAT FOR THE CODE SCAT2

SCAT2: Input data description

Card 1. IPR, IDA, IBA, IPU (4I3)

- IPR = 1 Print transmission coefficients and cross-sections
- IPR = 0 Don't print
- IDA = 1 Compute elastic scattering angular distribution for equidistant angles (2.5)
- IDA = 2 equidistant cosines (.02)
- IDA = 0 Don't compute
- IDA = −1 | same as IDA = 1 or 2 and
- IDA = −2 | compute Legendre coefficients
- IBA = 1 Print transmission coeff. on Tape11 in GNASH format
- IBA = 2 Print transmission coeff. on Tape11 in STAPRE format
- IBA = 0 Don't print

Card 2. NE = Number of incident energies (I3)

Card 3. (EN(J),J=1,NE) (6E12.5)

EN(J) = Incident energies in MeV, if EN(1) > 0 center-of-mass
if EN(1) < 0 laboratory

Card 4. IZT, IMT (2I3)

- IZT = Atomic number | of the target
- IMT = Mass number |

Card 5. IP, IPOT (2I3)

IP = Type of incident particle, 1 = neutron, 2 = proton, 3 = deuteron, 4 = triton, 5 = helium−3, 6 = alpha

IPOT = 0 The optical parameters have to be read on the 5 following cards

IPOT # 0 Select some systematic parameters, go to Card 11

n	1 Wilmore Hodgson	2 Bechetti Greenless
	3 Ferrer Rapdport	4 Cindro Bersillon
	5 Madland	
p	1 [illegible]	2 [illegible] Greenless
d	1 [illegible]	[illegible]

Card 6. R(1),A(1),(POT(1,I),I=1,4),BETA (6E12.5,F6.3)

<u>Real well parameters</u>

- R(1) = Reduced radius
- A(1) = Diffuseness
- POT(1,I) = Depth parameters

  V = POT(1,1)+POT(1,2)*E+POT(1,3)*E*E+POT(1,4)*Log(E)
- BETA = Non-locality range

Card 7. R(2),A(2),(POT(2,I),I=1,4),A(5) (6E12.5,F6.3)

<u>Imaginary surface well parameters</u>

- R(2) = Reduced radius (if > 0 DWS, if < 0 gaussian)
- A(2) = Diffuseness (if A(5)#0 then A(2) = A(2) + A(5)*E)
- POT(2,I) = Depth parameters (see Card 6)
- A(5) = Slope of the diffuseness

Card 8. R(3),A(3),(POT(3,I),I=1,4) (6E12.5)

<u>Imaginary volume well parameters</u>

- R(3) = Reduced radius
- A(3) = Diffuseness
- POT(3,I) = Depth parameters (see Card 6)

Card 9. R(4),A(4),(POT(4,I),I=1,4) (6E12.5)

<u>Spin-orbit well parameters</u>

- R(4) = Reduced radius
- A(4) = Diffuseness
- POT(4,I) = Depth parameters (see Card 6)

Card 10. R(5), EWMAX (2E12.5)

- R(5) = Coulomb radius
- EWMAX = Energy above which the surface well depth is constant

Card 11. ISUIT Return flag (I3)

- ISUIT = 0 End
- ISUIT = 1 New complete case, go to Card 2
- ISUIT = 2 Keep the energy grid, go to Card 4
- ISUIT = 3 Only change the potential parameters, go to Card 5

[illegible] (I),I=1,10) Title (10A8).

APPENDIX B.

INPUT DATA FOR TRANSMISSION COEFFICIENTS CACULATIONS

```
 2   0   1   0
24
          25.0        24.0        23.0        22.0        21.0        20.0
          19.0        18.0        17.0        16.0        15.0        14.0
          13.0        12.0        11.0        10.0         9.0         8.0
           7.0         6.0         5.0         4.0         3.0         2.0
41 93
 1 0
          1.24        0.62        49.5       -0.28         0.0         0.0   (
          1.26        0.58         3.4        0.37         0.0         0.0   (
           0.0         0.0         0.0         0.0         0.0         0.0
          1.12        0.47         0.0         0.0         0.0         0.0
           0.0         0.0
 0
```

APPENDIX C.

DESCRIPTION OF INPUT DATA FORMAT FOR THE CODE STAPRE

Quoted sections or equations refer to these addenda. If reference is made to IRK 76/01 or to Addenda, September 1976, it will be explicitly stated.

1.) TITEL

FORMAT ~~(8 A 10)~~

Title of the problem

Note: The first column must contain an * as indicator of the beginning of a new problem.

2.) NLAUF (I), I = 1,7

FORMAT (7 I 2)

NLAUF (1) ... code for the projectile

NLAUF (I), I ≥ 2 ... code for the particle emitted from the (I-1)th CN

Note: Code numbers for the particles:

1 ... neutron
2 ... proton
3 ... alpha particle
4 ... deuteron
99 ... non-standard particle

Restrictions: 1 ≤ NLAUF (I) ≤ 4 or NLAUF (I) = 99 for I = 1,
1 ≤ NLAUF (I) ≤ 4 for I ≥ 2.

Examples: (α, p) b3b2
(^{16}O, 3nα) ... 99b1b1b1b3
(n, γ) ... b1

3.) N, NGACOM, NPAR, LLMAX, DU, NFISS, NPHI

FORMAT (4 I 2, F 5.3, 2 I 2)

N ... total number of compound nuclei

NGACOM ... number of the compound nucleus for which gamma-ray cascades are taken into account for the first time (cf. sec. 2.5. of IRK 76/01 ; NGACOM = N_γ + 1)

NPAR ... types of particles whose emission is accounted for in the Hauser-Feshbach denominator

1 ... neutrons
2 ... neutrons, protons
3 ... neutrons, protons, alpha particles
4 ... neutrons, protons, alpha particles, deuterons

LLMAX ... maximum multipolarity of γ-rays

1 ... E1 and M1 radiation

2 ... E1,M1,E2,M2 radiation

3 ... E1, ..., M3 radiation

DU ... binsize (MeV) of the energy grid

NFISS ... code for the calculation of fission cross sections

0 ... fission decay is ignored

1 ... fission decay is taken into account as described in section 1.

2 ... fission decay is taken into account. For the WF - corrected first chance fission cross section, however, all continuum fission channels are treated as one single channel. The fluctuation index of this channel is derived from NNFREI (see record 4.) below) and a generalized χ^2 distribution equivalent to the actual distribution up to the second moment.

NPHI ... code for the treatment of the averaging of the WF - corrected first chance fission cross section with respect to intermediate class II structure

0 ... equ. (11') is used

>0 ... equ. (11) is used. In this case the maximum number of meshpoints for the integration with respect to E is $2^{NPHI} + 1$. Recommended values for NPHI are 5 or 6. If the prescribed accuracy DDEL (cf. record 4.) is not achieved a message is printed out ("PHI INTEGRATION GENAUIGKEIT DEL= NICHT ERREICHT...."). In this case NPHI should be increased. The computation time which is considerable for NPHI > 0 can be reduced by putting NFISS equal to 2.

Restrictions: $1 \leq N \leq 6$

$1 \leq$ NGACOM $\leq$ N

$1 \leq$ NPAR ≤ 4

NPAR $\geq$ NLAUF (I), { I = 1, N if NLAUF (1) ≤ 4 ; I = 2, N if NLAUF (1) = 99 }

$1 \leq$ LLMAX ≤ 3

4.) NNWFC, GRE, NNFREI, DDEL, NNINT

FORMAT (I2, F6.2, I2, F6.2, I4)

NNWFC ... switch for the width fluctuation correction

0 ...on

1 ...off

GRE ... limit for the Hauser-Feshbach denominator above which the width fluctuation correction factor is put equal to unity (cf. section 4. of TRK 76/01)

Note: If columns 3 to 8 are left blank, GRE = 50 is assumed.

NNFREI ... fluctuation index for the width fluctuation correction (cf. section 2.2. of TRK 76/01)

Note: If columns 9 and 10 are left blank, NNFREI = 1 is assumed.

DDEL ... prescribed relative accuracy for the integration in the width fluctuation correction (cf. section 4 of TRK 76/01)

Note: If columns 11 to 16 are left blank, DDEL = .01 is assumed.

NNINT ... maximum number of mesh-points for the calculation of the integral in the width fluctuation correction

Note 1: NNINT must be a power of 2.

Note 2: If NNINT = 0 the program assumes NNINT = 64.

Note 3: If NNINT > 64 " " NNINT = 64.

5.) (PARC (I,1), PARC (I,2)), I = 1, N

FORMAT (6(A2, F3.0))

PARC (I,1) ... chemical symbol } of the I^{th} CN

PARC (I,2) ... charge number

6.) ATAR, STAR, KPTAR, Q

FORMAT (F4.0, F4.1, I2, F6.2)

ATAR ... mass number } of the target nucleus

STAR ... spin

KPTAR .. parity (+1 or -1)

Q ...... separation energy (MeV) of the projectile from the 1^{st} CN

Note 1: If NLAUF (1) ≠ 9, the columns 11 - 16 may be left blank, because Q is determined by other input data.

Note 2: If NLAUF (1) = 99 and the non-standard projectile has negative parity, KPTAR has to be replaced by its opposite.

7.) AGESCH, SGESCH

FORMAT (F4.0, F4.1)

AGESCH ... mass number } of the projectile
SGESCH ... spin }

Note: For NLAUF (1) ≠ 99 record 7.) has to be omitted.

8.) EEINL, KDE, KKZZNM

FORMAT (F6.2, I2, I3)

EEINL ... L. S. bombarding energy (MeV). The program alters the incident energy in such a way as to adjust the excitation energy of the first CN to the upper edge of the corresponding bin of the energy grid defined by DU.

KDE ... The incident energy can be varied stepwise in such a way that the excitation energy of the first CN is reduced by KDE * DU by each step. (KDE > 0)

KKZZNM ... number of incident energies - generated from EEINL as described above - for which the calculations are done; for KKZZNM = 0 the program assumes KKZZNM = 1.

9.) FM, NPI, NHI, IPAULI, KTESTP, MILANO, PHIMIL

FORMAT (F 8.0, 5 I2, F 6.2)

FM ... the constant (MeV^3) which by equ. (7) of IRK 76/01 defines the matrix element for internal transitions competing with preequilibrium decay. For FM = 0, pre-equilibrium decay is not taken into account.

NPI ... initial particle number

NHI ... initial hole number

IPAULI ... switch for inclusion of the Pauli principle in the calculation of internal transition rates

0 ... off

1 ... on

KTESTP ... code for the parameters g and $D\Delta$ in equ. (10') of Addenda, Sept. 1976

0 or 1 ... $g = \frac{6}{\pi^2}\frac{A}{8}$, $D\Delta = 0$

2 or 3 ... $g = \frac{6}{\pi^2}\frac{A}{8}$, $D\Delta = 12\, A^{-1/2} \cdot \begin{cases} 0 & \text{for odd} \\ 1 & \text{for odd mass} \\ 2 & \text{for even} \end{cases}$ nuclei

4 or 5 ... $g = \frac{6}{\pi^2}\frac{A}{8}$, $D\Delta = \Delta$

6 or 7 ... $g = \frac{6}{\pi^2}a$, $D\Delta = 0$

8 or 9 ... $g = \frac{6}{\pi^2}a$, $D\Delta = \Delta$

MILANO ... switch for the calculation of the emission rates for nucleon induced reactions

0 ... equ. (9) of IRK 76/01 is used for $\lambda_\nu(n,\varepsilon_\nu)d\varepsilon_\nu$

1 ... equs. (9') and (9") of Addenda, Sept. 1976 are used for the emission rates of nucleons and alpha particles, respectively

PHIMIL ... the probability φ in equ. (9") of Addenda, Sept. 1976

Note 1: For odd values of KTESTP internal transition rates and some other quantities related to preequilibrium decay are printed out.

Note 2: For PHIMIL ≤ 0 for alpha particle emission rates equ. (9) of IRK 76/01 is used instead of equ. (9") of Addenda, Sept. 1976.

Note 3: For MILANO = 1 the program assumes the following values for the initial numbers of particles and holes: NPI = 2, NHI = 1.

10.) KTEST1, KTEST2, KTEST3, KTESTW, KUAPR

FORMAT (5I2)

KTEST1 ... switch for printing level densities, the contributions to the Hauser-Feshbach denominator of the different particles and of photons, the fission probabilities and the total decay width

0 ... off

1 ... on

KTEST2 ... switch for printing the quantities WB (E, I, Π) DU and $\overline{WB}$ (E, I, Π) DU (cf. section 2. of IRK 76/01)

ϕ ... off

1 ... on

KTEST3 ... switch for printing particle and, if calculated, gamma-ray spectra resulting from the decay of the different compound nuclei

KTESTW ... key for the extension of the protocol of the calculation of the width fluctuation correction

ϕ ... very short

1 ... very detailed and long

KGAPR ... key for printing production cross sections for gamma-rays from discrete levels

ϕ or 1 ... none

≥ 2 ... for the levels 2, ..., J (J = min (number of discrete levels, KGAPR))

11.) Separation energies for all particles evaporated from each CN

The following record has to be supplied for all compound nuclei (I = 1,N).

11.I.) PARR(I, K), K = 1, NPAR

FORMAT (4 F 6.2)

PARR (I, K) ... separation energy (MeV) of particle with code number K from CN with number I

12.) Data regarding transmission coefficients for non-standard incoming particle

12.1.) LMAX

FORMAT (I2)

number of partial waves

12.2.) TEXT

FORMAT (8A1ϕ)

alpha numerical text

The following blocks of data 12.3.) and 12.4.) must be supplied for the LMAX partial waves with ascending orbital angular momentum ϕ, 1, 2, ...,LMAX - 1.

12.3.) NN

FORMAT (I2)

number of energy values for which transmission coefficients of the orbital angular momentum considered are prepared

Restriction: 4 ≤ NN ≤ 1ϕϕ

12.4.) X(II), Y(II), II = 1, NN

FORMAT (8(F4.2, E5.3))

X(II) ... energy (MeV)

Y(II) ... transmission coefficient for energy X(II)

Note: The block of data 12.) must be omitted for NLAUF(1) ≠ 99.

13.) NTRAN

FORMAT (I2)

number of blocks of data regarding transmission coefficients to be read below (14.))

Note: NTRAN can assume two values only: 1 or N

1 ... a single set of transmission coefficients is used for all CN^i

N ... each CN has its own set of transmission coefficient

14.) Data regarding transmission coefficients for standard particles

14.1.) LO(K), K = 1, NPAR

FORMAT (4I2)

LO (K) ... number of partial waves for which transmission coefficients for particle with code K will be read in 14.3.)

The following blocks 14.2.I.K.), 14.3.I.K.1.) and 14.3.I.K.2.) must be supplied for NTRAN values of I. In case NTRAN = N, I in increasing order numbers the CN^i, while for NTRAN = 1, the data may be those of any of the CN^i. For a given I, the three blocks have to be prepared for each particle coded by K (K = 1, NPAR) in a manner analogous to that of 12.2.), 12.3.) and 12.4.), that means 14.3.I.K.1.) and 14.3.I.K.2.) for the LO(K) partial waves to be considered for that particle. For illustrating the structure of blocks 13.) and 14.), fig.3*) of IRK 76/01 shows these data for the case N = 2, NPAR = 3).

14.2.I.K.) <u>TEXT</u>
FORMAT (8A10)
alpha numerical text

14.3.I.K.1.) <u>NN</u>
FORMAT (I2)
number of energy values for which transmission coefficients of the considered orbital angular momentum are prepared
Restriction: $4 \leq NN \leq 100$

14.3.I.K.2.) <u>X (II), Y (II), II = 1, NN</u>
FORMAT (8(F4.2, E5.3))
X (II) ... energy (MeV)
Y (II) ... transmission coefficient for energy X (II)

15.) <u>(DC (L), L = 1, 13), ISYMC</u>
FORMAT (13 F 6.0, I2)
DC (L) ... level density parameters for the first compound nucleus
The following symbols are explained in sec. 2. of these addenda and in sec. 3. 3. of IRK 76/01.

DC (1) ... a (MeV^{-1})
DC (2) ... $\theta_{eff}/\theta_{rigid}$ (θ_{rigid} .. rigid body moment of inertia)
DC (3) ... Δ (MeV)
DC (4) ... δW (MeV)
DC (5) ... E_1^t (MeV)
DC (6) ... C_1 (MeV^{-1})
DC (7) ... T_1 (MeV)
DC (8) ... σ_1
DC (9) ... E_2^t (MeV)
DC (10) .. C_2 (MeV^{-1})
DC (11) .. T_2 (MeV)
DC (12) ... σ_2
DC (13) ... $\theta_{\perp}/\theta_{rigid}$

Note: If an energy dependent a-parameter is used (cf. equ. (16)), that is, if $\delta W \neq 0$ the input datum a represents the asymptotic a-parameter $\tilde{a}$.

ISYMC ... code for the angular momentum dependence of the level density
0 ... equ. (14)
1 ...equ. (17) with $G_{ax} = \frac{1}{2}$
2 ... equ. (17) with $G_{ax} = 1$
3 ... equ. (18) with $G_{ns} = \frac{1}{4}$
4 ... equ. (18) with $G_{ns} = \frac{1}{2}$
5 ... equ. (18) with $G_{ns} = 1$
-1 ... the level density is calculated by means of equ. (20) of IRK 76/01

16.) Discrete levels of the 1^{st} CN

16.1.) <u>NDISK</u>
FORMAT (I2)
number of levels
Restriction: $1 \leq NDISK \leq 50$

16.2.) <u>ED (J), SD (J), KPD (J), J = 1,NDISK</u>
FORMAT (6(F6.2, F4.1, I2))
ED (J) ... excitation energy (MeV)
SD (J) ... spin
KPD (J) ... parity (+1 or -1)
} of the J^{th} level

Note 1: The levels must be in order of ascending energy.
Note 2: Block 16.) has to be omitted for NGACOM > 1.

17.) Data regarding gamma-decay, level densities and discrete levels of residual nuclei after particle emission and fission input data
The following data have to be supplied for each CN (I = 1,N), except 17.I.1.1.), 17.I.1.2.) and 17.I.2.) which have to be prepared for $I \geq NGACOM$ only.

17.I.1.1.) <u>UB, S1, S2, KP, GR, NF, (UG (I), I = 1, 6)</u>
FORMAT (F 6.2, 2 F 4.1, I 2, F 7.3, I 2, 6 E 9.3)

*) The block numbers 14 and 15 in this figure should be replaced by 13 and 14, respectively.

UB ... neutron separation energy (MeV)
S1 ... } spins of s-wave neutron resonances
S2 ... }
KP ... parity " " "
GR ... average total radiation width (meV) at the neutron binding energy
Note: For GR = ϕ. the total radiation width is calculated according to D. G. Gardner /15/.
NF ... number of subsequent cards (17.I.1.2.)) for specifying the E1, ... strength functions
Note 1: For the present, NF ≤ 1.
Note 2: For NF = ϕ, all γ-ray strength functions are derived from the Weisskopf model.
PG(1) ... normalization factor for $f_{\gamma E1}(\varepsilon_\gamma)$
Note: For PG(1) = ϕ. the normalization is carried out by fitting the total radiation width to GR.
PG(2) ... $f_{\gamma M1}(\varepsilon_\gamma = UB)/f_{\gamma E1}(\varepsilon_\gamma = UB)$
PG(3) ... $f_{\gamma E2}(\varepsilon_\gamma = UB)/f_{\gamma E1}(\varepsilon_\gamma = UB)$

. .
. .
. .

PG(6) ... $f_{\gamma M3}(\varepsilon_\gamma = UB)/f_{\gamma E1}(\varepsilon_\gamma = UB)$
Note: For PG(I) = ϕ. (2 ≤ I ≤ 6) the quantities PG(I) are put equal to the ratios of the Weisskopf units.

17.I.1.2.) <u>(ERR(L), GRR(L), SRR(L), L = 1,3), ES1, ES2, FRS, QSP</u>

FORMAT (13 F6.2)
ERR (L) ... position (MeV) } for the L^{th} giant
GRR (L) ... width (MeV) } resonance of the
SRR (L) ... peak cross section (mb) } photo absorption cross section

Note1: For ERR (L) = ϕ. (L ≥ 2) the L^{th} resonance will not be taken into account.
Note2: For ERR (1) = ϕ. a single E1 giant resonance defined by the Brink-Axel parameters (ERR (1) = 8ϕ.$A^{-1/3}$, GRR (1) = 5, SRR (1) = 13.A/5) will be accounted for.

ES1 ... lower limit (MeV) of the step } mentioned in
ES2 ... upper " " " " " } equ. (28)
FRS ... reduction factor (ϕ < FRS < 1) }
Note: If columns 55 to 78 are left blank, no step is taken into consideration.
QSP ... fraction of the Weisskopf contribution $f_{\gamma E1}^{Weisskopf}$ to the strength function $f_{\gamma E1}^{photo\ abs.}(\varepsilon_\gamma)$:
$f_{\gamma E1}^{Weisskopf} = QSP * f_{\gamma E1}^{photo\ abs.}(\varepsilon_\gamma = UB)$
Note: If NF = ϕ (cf. 17.I.1.1.)) the card 17.I.1.2.) has to be omitted.

17.I.2.) <u>(VZD (L,M), M = 1, L), L = 1, NDISKC</u>
FORMAT (25 F3.ϕ)
VZD (L,M) ... branching ratio for the gamma transitions from the L^{th} to the M^{th} level of the I^{th} CN
Note 1: NDISKC is the number of discrete levels which are in order of ascending energy, of the I^{th} CN.
Note 2: The VZD (L,M) need not be normalized.
Note 3: For a stable or isomeric level L VZD (L,M) = ϕ. for M = 1, L.

The following blocks 17.I.3.LP.1.) to 17.I.3.LP.3.) refer to the residual nucleus after evaporation of particle with code number LP from the I^{th}CN and have to be prepared for LP = 1, NPAR.

17.I.3.LP.1) <u>(DR (L), L = 1,13), ISYM</u>

FORMAT (13 F 6.ϕ, I 2)
DR (L) ... level density parameters
ISYM ... code for angular momentum dependence of the level density
Note: DR (L) and ISYM have the same meaning as the

quantities DC (L) and ISYMC described in connection with record 15.).

17.I.3.LP.2.) NIN1, NAME

FORMAT (I2, A10)

NIN1 ... number of levels

NAME ... arbitrary comment

Restriction: 1 ≤ NIN1 ≤ 56.

17.I.3.LP.3.) (EDR (J), SDR (J), KPDR (J), J = 1, NIN1)

FORMAT (6(F6.2, F4.1, I2))

EDR (J) ... excitation energy (MeV) } of the J^{th} level

SDR (J) ...spin } of the J^{th} level

KPDR (J) ... parity (+1 or -1) } of the J^{th} level

Note: The levels should be in order of ascending energy.

The following blocks 17.I.4.) and 17.I.5.NB.1.) to 17.I.5.NB.3.) refer to fission. They have to be omitted if in record 3.) NFISS is specified as zero.

17.I.4.) (BARR (L), L = 1, 12), NSTEP

FORMAT (12 F6.2, I4)

BARR (L) ... parameters of the deformation potential described in section 1.3.1. and illustrated in fig. 1.

BARR (1) ... E_A (MeV)

BARR (2) ... $\hbar\omega_A$ (MeV)

BARR (3) ... E_B (MeV)

BARR (4) ... $\hbar\omega_B$ (MeV)

BARR (5) ... E_{II} (MeV)

BARR (6) ... $\hbar\omega_{II}$ (MeV)

BARR (7) ... W_o

BARR (8) ... W_1 (MeV)

BARR (9) ... QQ1 (MeV)

BARR (10) .. QQ (MeV)

BARR (11) .. ρ

BARR (12) .. unassigned

NSTEP ... number of meshpoints for integration of equ. (13)

Note1: From the quantities BARR (L) the control parameter NBARR is derived as follows:

i. NBARR = 1 if BARR (L) = ϕ for L ≥ 3 indicating that a single humped fission barrier is assumed.

ii. NBARR = 2 if BARR (L) = ϕ for L ≥ 5 indicating that a double humped barrier and complete damping in the secondary minimum is assumed.

iii. NBARR = 3 if BARR (5) > ϕ and BARR (6) > ϕ indicating that a double humped barrier and partial damping in the secondary minimum is assumed. Only in this case equ. (13) is solved.

Note 2: If columns 61 to 66 are left blank, ρ = 2 is assumed.

Note 3: NSTEP ≤ INDE + INDJ (see IRK 76/01 for INDE and INDJ); if columns 73 to 76 are left blank, NSTEP is determined by an internal criterion.

The following blocks 17.I.5.NB.1.) to 17.5.I.NB.3.) refer to the barrier transition states which are discussed in sec. 1.3.2. Depending on the value assigned to NBARR (cf. Note 1 of record 17.I.4.) they have to be supplied for NB = 1, NBARR; that is, for the single humped barrier if NBARR = 1, for barrier A (NB = 1) and barrier B (NB = 2) if NBARR = 2 and for barrier A (NB = 1), barrier B (NB = 2) and the combined barrier AB (NB = 3) if NBARR = 3.

17.I.5.NB.1.) (DR (L), L = 1, 13), ISYM (NB)

FORMAT (13 F 6.0, I2)

DR (L) ... level density parameters for the continuum of the transition states

ISYM (NB) ... code for angular momentum dependence of level density

Note: DR (L) and ISYM (NB) have the same meaning as the corresponding quantities DC (L) and ISYMC described in connection with record 15.).

17.I.5.NB.2.) NFISSD (NB), (DFISS (L, NB), L = 1, 4)

FORMAT (I2, 4 F 6.2)

parameters related to the discrete transition states (cf. sec. 1.3.2.)

NFISSD (NB) ...number of bandheads (≤ 10)
DFISS (1, NB) ... rotational constant A_r (keV)
DFISS (2, NB) ... decoupling parameter c
DFISS (3, NB) ... unassigned
DFISS (4, NB) ... the continuum of transition states starts at the lower edge of the first bin (binsize DU) above DFISS (4, NB)

Note 1: DFISS (4, NB) is given in MeV.

Note 2: For DFISS (4, NB) = 0 all transition states are treated as continuum and the following record 17.I.5.NB.3.) has to be omitted.

17.I.5.NB.3.) (EB (L, NB), KB (L, NB), PB (L, NB), L = 1, NFISSD (NB))

FORMAT (6(F 6.2, F 4.1, I 2))
heads of rotational bands
EB (L, NB) ... excitation energy (MeV) } of the L^{th} bandhead
KB (L, NB) ... K quantum number } of the L^{th} bandhead
PB (L, NB) ... parity (+1 or -1) } of the L^{th} bandhead

Note 1: For K = 0 bands and axial symmetric shapes with R-symmetry the spin sequence is:
I = 0, 2, 4,... if ISYM (NB) = 0 or 1 and KB(L,NB)=0;
I = 1, 3, 5,... if ISYM (NB) = 0 or 1 and KB(L,NB)=0.1.

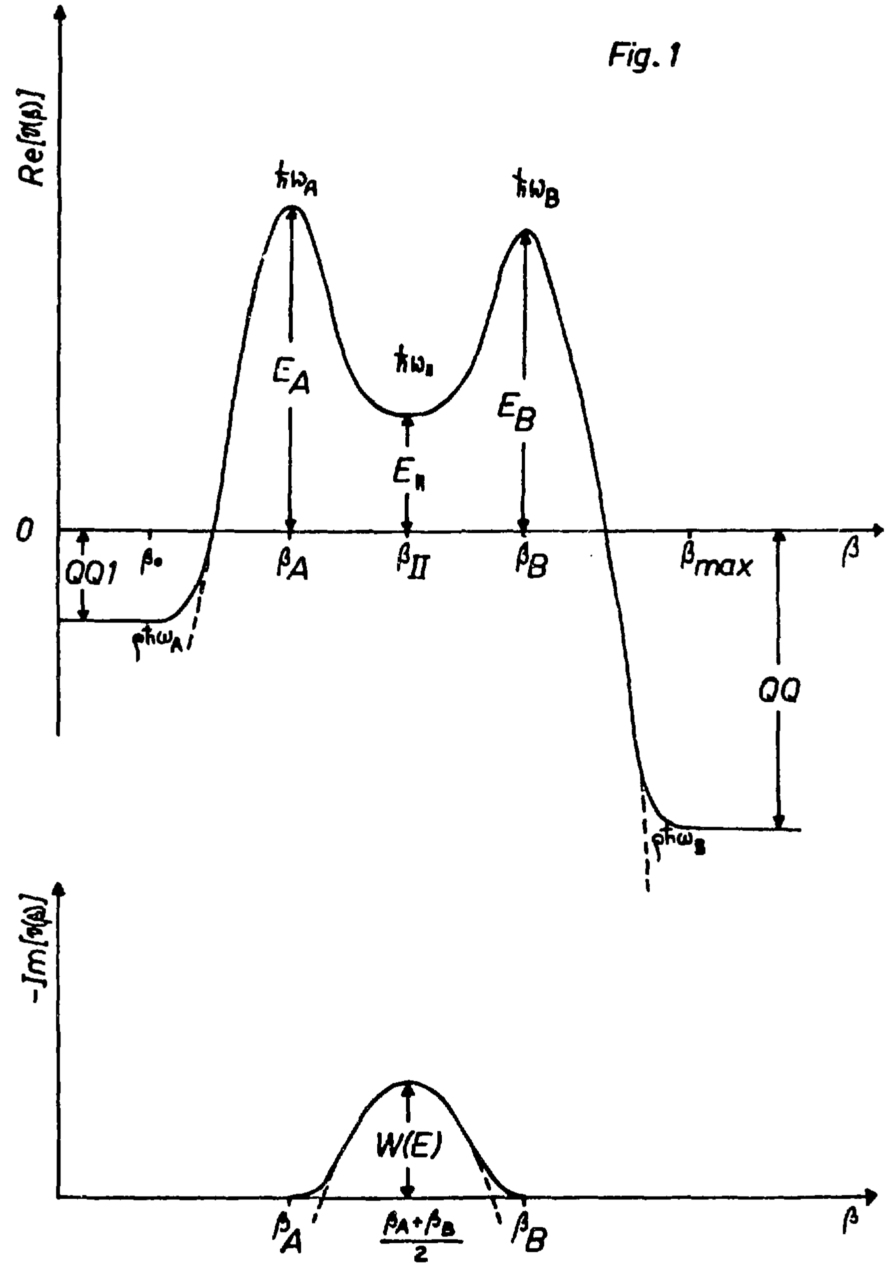
Note 2: EB (L,NB) is referred to the lowest transition state.

Note 3: For PB (L, NB) = 2 it is assumed that there are two bandheads with EB (L, NB) and KB (L, NB): one with positive and one with negative parity.

——— xxx ———

Six local files with unit numbers 1, 2, 3, 4, 8 and 9 are used.
Card reader and line printer have unit numbers 5 and 6, respectively.

Fig. 1



APPENDIX D.

INPUT DATA FOR THE NEUTRON EMISSION SPECTRA CALCULATIONS

```
*  41-NB-93(N,N')  (N,2N)  (N,3N)  EMISSION  SPECTRA
 1 1 1 1
 4  2  3  2  0.50  0  0
 0                    0
NB41.NB41.NB41.NB41.
 93. 4.5+1
 14.0    2    4
     230.  2  1  1  3  1  0.18
 0  0  1  0  0  14110
 7.230   6.48    2.190
 8.83    5.95    1.920
 7.883   5.74    4.489
12.055   4.74    5.425
 1
141117
1NEUTRON  TRRANSMISSION  COEFF.  FOR  A=93,Z=41
18
  .1   .8307672E-01   .5   .1770376E-00   1.0   .2424654E-00   2.0   .3301682E-00
 3.0   .3953156E-00   4.0   .4495528E-00   5.0   .4969810E-00   6.0   .5394723E-00
 7.0   .5780064E-00   8.0   .6131494E-00   9.0   .6229892E-0010.0   .6327550E-00
11.0   .6408512E-0012.0   .6475278E-0013.0   .6529135E-0015.0   .6602819E-00
20.0   .66331336-0022.0   .6596481E-00
22
0.05   .6448632E-01   .1   .1732423E-00   .15   .2945611E-00   .25   .5194085E-00
  .5   .8461736E-00   .75   .9562107E-00   1.0   .9847113E-00   2.0   .9440342E-00
 3.0   .8935868E-00   4.0   .8590387E-00   5.0   .8354231E-00   6.0   .8188715E-00
 7.0   .8070641E-00   8.0   .7986027E-00   9.0   .7736406E-0010.0   .7525797E-00
11.0   .7336190E-0012.0   .7165225E-0013.0   .7010908E-0015.0   .6745793E-00
20.0   .6281077E-0022.0   .6155198E-00
22
  .1   .3756487E-030.25   .3354730E-02   0.5   .1591321E-010.75   .3667005E-01
 1.0   .6309259E-01   1.5   .1247525E-00   2.0   .1876261E-00   2.5   .2481719E-00
 3.0   .3041965E-00   4.0   .4020529E-00   5.0   .4832363E-00   6.0   .5509544E-00
 7.0   .6078415E-00   8.0   .6558950E-00   9.0   .6746200E-0010.0   .6900938E-00
11.0   .70155795-0012.0   .7097709E-0013.0   .7153156E-0015.0   .7201433E-00
20.0   .7090679E-0022.0   .6993381E-00
22
  .1   .2200530E-040.25   .5600192E-03   0.5   .6554353E-020.75   .2705293E-01
 1.0   .7014012E-01   1.5   .2205173E-00   2.0   .4043934E-00   2.5   .5617523E-00
 3.0   .6582083E-00   4.0   .7177144E-00   5.0 . .7180756E-00   6.0   .7109221E-00
 7.0   .7059109E-00   8.0   .7041594E-00   9.0   .68892400-0010.0   .6763675E-00
11.0   .6654393E-0012.0   .6560936E-0013.0   .64820309-0015.0   .6361771E-00
20.0   .6214145E-0022.0   .6192062E-00
21
0.25   .7030080E-06   0.5   .1531342E-040.75   .9151685E-04   1.0   .3223217E-03
 1.5   .1868112E-02   2.0   .6399203E-02   2.5   .1643630E-01   3.0   .3512633E-01
 4.0   .1116693E-00   5.0   .2520119E-00   6.0   .4369532E-00   7.0   .6177325E-00
```

```
 8.0   .7578913E-00   9.0   .8397295E-0010.0   .8863497E-0011.0   .9076364E-00
12.0   .9124700E-0013.0   .9070867E-0015.0   .8806306E-0020.0   .7946572E-00
22.0   .7633425E-00
16
 1.0   .1459299E-04   2.0   .5938569E-03   3.0   .5168088E-02   4.0   .2326686E-01
 5.0   .6708896E-01   6.0   .1340998E-00   7.0   .2068802E+00   8.0   .2768983E+00
 9.0   .3387148E+0010.0   .3942012E+0011.0   .4449515E+0012.0   .4914916E+00
13.0   .5337031E+0015.0   .6044843E+0020.0   .7093726E+0022.0   .7292977E+00
15
 2.0   .1955569E-04   3.0   .2676824E-03   4.0   .1707117E-02   5.0   .6990910E-02
 6.0   .2072033E-01   7.0   .4715121E-01   8.0   .8739299E-01   9.0   .1408420E-00
10.0   .2043865E-0011.0   .2776165E-0012.0   .3592406E+0013.0   .4442472E+00
15.0   .5920053E+0020.0   .7161446E+0022.0   .7168067E+00
14
 3.0   .71650962-05   4.0   .5378264E-04   5.0   .2505588E-03   6.0   .8661721E-03
 7.0   .2443791E-02   8.0   .5952973E-02   9.0   .1232073E-0110.0   .2365817E-01
11.0   .4264529E-0112.0   .7287091E-0113.0   .1185061E-0015.0   .2668887E-00
20.0   .6736638E+0022.0   .7422991E+00
13
 4.0   .2936536E-05   5.0   .1637301E-04   6.0   .6479173E-04   7.0   .2027502E-03
 8.0   .53516806-03   9.0   .1168954E-0210.0   .2329743E-0211.0   .4300710E-02
12.0   .7462032E-0213.0   .1230389E-0115.0   .2963586E-0120.0   .1628172E-00
22.0   .2747768E-00
12
 5.0   .1149147E-05   6.0   .5326432E-05   7.0   .1895022E-04   8.0   .5563050E-04
 9.0   .1327432E-0310.0   .2850331E-0311.0   .5604189E-0312.0   .1025685E-02
13.0   .1769270E-0215.0   .4570302E-0220.0   .2792262E-0122.0   .4939761E-01
10
 7.0   .1777294E-05   8.0   58564091E-05   9.0   .1541934E-0410.0   .3604344E-04
11.0   .7630703E-0412.0   .1490267E-0313.0   .2722458E-0315.0   .7744976E-03
20.0   .5598985E-0222.0   .1039742E-01
 9
 8.0   .6018510E-06   9.0   .1760100E-0510.0   .4507325E-0511.0   .1033687E-04
12.0   .2166553E-0413.0   .4214587E-0415.0   .1334191E-0320.0   .1169813E-02
22.0   .2301735E-02
 7
10.0   .5449797E-0511.0   .1361794E-0512.0   .3080061E-0513.0   .6412830E-05
15.0   .2279237E-0420.0   .2461576E-0322.0   .5154097E-03
 4
13.0   .9414701E-0615.0   .3795770E-0520.0   .5145080E-0422.0   .1151552E-03
1PROTON  TRANSMISSION  COEFF.  FOR  A=93,Z=41
15
 2.0   .1455555E-04   3.0   .1665555E-02   4.0   .1217390E-01   5.0   .9602100E-01
 6.0   .2236840E+00   7.0   .3585050E+00   8.0   .4684490E+00   9.0   .5490090E+00
10.0   .6063320E+0011.0   .6472730E+0012.0   .6769760E+0013.0   .6989370E+00
15.0   .7281670E+0020.0   .7615000E+0022.0   .7680390E+00
14
 3.0   .6665555E-03   4.0   .1260400E-01   5.0   .8565900E-01   6.0   .2949020E+00
 7.0   .5901480E+00   8.0   .8160880E+00   9.0   .9321170E+0010.0   .9789110E+00
11.0   .9925500E+0012.0   .9916810E+0013.0   .9847500E+0015.0   .9655420E+00
20.0   .9198070E+0022.0   .9042780E+00
14
 3.0   .1655555E-03   4.0   .2855000E-02   5.0   .1769800E-01   6.0   .6029300E-01
 7.0   .1382730E+00   8.0   .2411630E+00   9.0   .3488730E+0010.0   .4459080E+00
11.0   .5260030E+0012.0   .5892210E+0013.0   .6382040E+0015.0   .7053660E+00
20.0   .7822490E+0022.0   .7966280E+00
14
 3.0   .3255555E-04   4.0   .7750000E-03   5.0   .6829000E-02   6.0   .3288100E-01
 7.0   .1033900E-00   8.0   .2315390E+00   9.0   .3995150E+0010.0   .5513110E+00
11.0   .6714040E+0012.0   .7516630E+0013.0   .8012140E+0015.0   .8472120E+00
```

```
20.0   .8593810E+0022.0   .8540100E+00
13
 4.0   .3955555E-04   5.0   .3740000E-03   6.0   .2018000E-02   7.0   .7526000E-02
 8.0   .2176700E-01   9.0   .5212100E-0110.0   .1071460E-0111.0   .1926930E+00
12.0   .3064190E+0013.0   .4355020E+0015.0   .6713420E+0020.0   .9181940E+00
22.0   .9391250E+00
13
 4.0   .5555550E-05   5.0   .5200000E-04   6.0   .3250000E-03   7.0   .1360000E-02
 8.0   .4322000E-02   9.0   .1122300E-0110.0   .2492600E-0111.0   .4870800E-01
12.0   .8527400E-0113.0   .1354210E+0015.0   .2660940E+0020.0   .5718570E+00
22.0   .6480270E+00
12
 5.0   .3555555E-05   6.0   .2555555E-04   7.0   .1265555E-03   8.0   .4785555E-03
 9.0   .1472555E-0210.0   .3865555E-0211.0   .8891555E-0212.0   .1836755E-01
13.0   .3450855E-0115.0   .9504555E-0120.0   .3992255E-0022.0   .5312655E+00
11
 6.0   .1555555E-05   7.0   .7555555E-05   8.0   .3155555E-04   9.0   .1045555E-03
10.0   .2975555E-0311.0   .7445555E-0312.0   .1685555E-0213.0   .3511555E-02
15.0   .1248455E-0120.0   .1261275E-0022.0   .2341336E-00
 9
 8.0   .2555556E-05   9.0   .8555555E-0510.0   .2555555E-0411.0   .6555557E-04
12.0   .1565555E-0313.0   .3455556E-0315.0   .1307556E-0220.0   .1656753E-01
22.0   .3656355E-01
 8
 9.0   .1555550E-0510.0   .2555552E-0511.0   .6555556E-0412.0   .1655149E-04
13.0   .3655555E-0415.0   .1535555E-0420.0   .2277551E-0222.0   .5277550E-02
 6
11.0   .1555555E-0512.0   .2555566E-0513.0   .4555552E-0515.0   .1955551E-04
20.0   .3395556E-0322.0   .8325551E-03
1TRANSMISSION COEFFICIENTS FOR A+39-Y-89 ALPHA
10
 7.0   .2255553E-04   8.0   .4745555E-03   9.0   .5538554E-0210.0   .3914255E+00
11.0   .1712992E+0012.0   .4422115E+0013.0   .7111295E+0015.0   .9389745E+00
20.0   .9974725E+0022.0   .9990125E+00
10
 7.0   .1855557E-04   8.0   .3875550E-03   9.0   .4596555E-0210.0   .3320555E-01
11.0   .1504285E+0012.0   .4071225E+0013.0   .6814725E+0015.0   .9288985E+00
20.0   .9965485E+0022.0   .9987185E+00
10
 7.0   .1255513E-04   8.0   .2595555E-03   9.0   .3114555E-0210.0   .2313955E-01
11.0   .1112382E+0012.0   .3332345E+0013.0   .6168855E+0015.0   .9142965E+00
20.0   .9965955E+0022.0   .9986825E+00
10
 7.0   .6555551E-05   8.0   .1445555E-03   9.0   .1775555E-0210.0   .1377155E-01
11.0   .7121255E-0112.0   .2408475E+0013.0   .5124385E+0015.0   .8769145E+00
20.0   .9947065E+0022.0   .9981335E+00
10
 7.0   .3555555E-05   8.0   .6755555E-04   9.0   .8415555E-0310.0   .6756555E-02
11.0   .3743255E-0112.0   .1444075E+0013.0   .3706945E+0015.0   .8168565E+00
20.0   .9931690E+0022.0   .9974235E+00
10
 7.0   .1555555E-05   8.0   .2755555E-04   9.0   .3455559E-0310.0   .2873678E-02
11.0   .1690855E-0112.0   .7263255E-0113.0   .2223815E+0015.0   .6982655E+00
20.0   .9881167E+0022.0   .9961235E+00
 9
 8.0   .1555555E-04   9.0   .1235558E-0310.0   .1040550E-0211.0   .6387556E-02
12.0   .2978755E-0113.0   .1061305E+0015.0   .5213885E+0020.0   .9797095E+00
22.0   .9930115E+00
 9
 8.0   .3555555E-05   9.0   .4055550E-0410.0   .3435559E-0311.0   .2159555E-02
```

```
12.0   .1058955E-0113.0   .4141555E-0115.0   .3019475E+0020.0   .9592332E+00
22.0   .9877140E+00
 9
 8.0   .1555551E-05   9.0   .1355551E-0410.0   .1055557E-0311.0   .6565555E-03
12.0   .3285557E-0113.0   .1359455E-0115.0   .1330815E+0020.0   .9122965E+00
22.0   .9722765E+00
 8
 9.0   .4555555E-0510.0   .3255555E-0411.0   .1945555E-0312.0   .9635550E-03
13.0   .4036555E-0215.0   .4531455E-0120.0   .8023335E-0022.0   .9400415E-00
 8
 9.0   .1555559E-0510.0   .9555555E-0511.0   .5755555E-0412.0   .2775555E-03
13.0   .1141555E-0215.0   .1344555E-0120.0   .5823795E-0022.0   .8476106E+00
 7
10.0   .3555555E-0511.0   .1755555E-0412.0   .8255555E-0413.0   .3295554E-03
15.0   .3710555E-0220.0   .2995845E-0022.0   .6551225E-00
 7
10.0   .1555555E-0511.0   .5555554E-0512.0   .2655553E-0413.0   .1055554E-03
15.0   .1059555E-0220.0   .1066565E-0022.0   .3551595E-00
 6
11.0   .2555555E-0512.0   .8555555E-0513.0   .3255556E-0415.0   .3235555E-03
20.0   .3073655E-0122.0   .13201155-00
 5
12.0   .3555557E-0513.0   .1055555E-0415.0   .1075554E-0320.0   .8542775E-02
22.0   .3793885E-01
 5
12.0   .1555551E-0513.0   .3555555E-0515.0   .3755556E-0420.0   .2587555E-02
22.0   .1080283E-01
 4
13.0   .1555553E-0515.0   .1355550E-0420.0   .8795555E-0322.0   .3343555E-02
 11.98 1.00-0.760                                                            -1
 11.24 1.00-0.463                                                            -1
35  NB-93  LVS
0.0   4.5  1  0.030  0.5-1  0.686  1.5-1  0.744  3.5  1  0.809  2.5  1  0.810  1.5-1
0.95  6.5  1  0.979  5.5  1  1.083  4.5  1  1.296  4.5  1  1.315  2.5-11.334  8.5  1
1.369  1.5  1  1.395  2.5  1  1.483  3.5-1  1.49  8.5  1  1.499  3.5-1  1.546  1.5  1
1.603  6.5  1  1.665  1.5  1  1.679  3.5  1  1.683  3.5  1  1.686  6.5  1  1.728  1.5  1
1.910  3.5-1  1.914  4.5  1  1.947  3.5  1  1.949  2.5  1  1.968  6.5  1  2.002  8.5  1
2.019  1.5  1  2.117  8.5  1  2.153  2.5-1  2.162  7.5  1  2.171  6.5  1
 10.33 1.  0.15                                                              -1
13  ZR-93  LVS
0.0  2.5  1  0.267  1.5  1  0.947  0.5  1  1.018  0.5  1  1.151  0.5  1  1.222  0.5  1
1.423  1.5  1  1.436  0.5  1  1.450  1.5  1  1.470  2.5  1  1.477  3.5  1  1.597  2.5  1
1.640  1.5  1
 8.91 1.  -0.74                                                              -1
10  Y-90  LVS
0.0  2.0-1  0.202  3.0-1  0.682  7.0  1  0.777  2.0  1  0.954  3.0  1  1.047  5.0  1
1.189  4.0  1  1.215  0.0-1  1.298  6.0  1  1.371  1.0-1
8.832   6.5   7.5   1   0.   0
0.
1.  0.
0.   1.   0.
1.   0.   0.   0.
1.   0.   0.   0.   0.
0.   1.   0.   0.   0.   0.
1.   0.   0.   0.   0.   0.   0.
1.   0.   0.   0.   0.   0.   0.   0.
0.   0.340.   0.660.   0.   0.   0.   0.
0.490.   0.   0.250.   0.260.   0.   0.   0.
0.   0.   0.   0.810.190.   0.   0.   0.   0.   0.
0.   0.   0.   0.   0.   0.   1.   0.   0.   0.   0.   0.
```

```
0.   0.   0.   0.   0.   1.   0.   0.   0.   0.   0.   0.   0.
0.   0.   0.   0.   0.   1.   0.   0.   0.   0.   0.   0.   0.   0.
0.810.   0.   0.   0.190.   0.   0.   0.   0.   0.   0.   0.   0.   0.
0.   0.   0.   0.   0.   0.   1.   0.   0.   0.   0.   0.   0.   0.   0.   0.
1.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.
0.   0.   1.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.
0.170.   0.   0.   0.   0.   0.570.190.070.   0.   0.   0.   0.   0.   0.   0.   0.
0.   0.   0.   1.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.
0.190.   0.5  0.   0.   0.   0.   0.   0.   0.   0.310.   0.   0.   0.   0.   0.   0.
0.280.   0.   0.480.   0.   0.   0.240.   0.   0.   0.   0.   0.   0.   0.   0.   0.
0.260.   0.   0.   0.   0.   0.410.330.   0.   0.   0.   0.   0.   0.   0.   0.   0.
0.   0.   0.   0.   0.   0.   0.   0.   1.   0.   0.   0.   0.   0.   0.   0.   0.   0.
1.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.
0.   0.   0.   0.   0.   0.   0.380.   0.620.   0.   0.   0.   0.   0.   0.   0.   0.
0.
0.   0.   0.   0.   0.   0.440.   0.560.   0.   0.   0.   0.   0.   0.   0.   0.   0.
0.  0.
0.370.   0.   0.290.390.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.
0.   0.   0.
0.320.   0.   0.   0.   0.   0.090.110.   0.   0.   0.   0.   0.   0.   0.480.   0.
0.   0.   0.   0.
0.   0.   0.   0.   0.   0.   1.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.
0.   0.   0.   0.   0.
0.   0.   0.   0.   0.   1.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.
0.   0.   0.   0.   0.   0.
0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   1.   0.   0.
0.   0.   0.   0.   0.   0.   0.
0.   1.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.
0.   0.   0.   0.   0.   0.   0.   0.
0.   0.   0.   0.   0.   0.   0.   1.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.
0.   0.   0.   0.   0.   0.   0.   0.   0.
0.070.   0.   0.   0.   0.   0.420.510.   0.   0.   0.   0.   0.   0.   0.   0.   0.
0.   0.   0.   0.   0.   0.   0.   0.   0.   0.
 8.92 1.  -1.740                                                                 -1
 6  NB-92  LVS
0.0   7.5   1  0.135   2.0   1   0.256   2.0-1   0.286   3.0   1   0.357   5.0   1   0.390   3.0-1
10.42 1.  0.77                                                                   -1
 9  ZR-92  LVS
0.0  0.0  1  0.934  2.0  1  1.382  0.0  1  1.495  4.0  1  1.847  2.0  1  2.67  2.0  1
2.15   4.0   1   2.340   3.0-1   2.400   4.0   1
 8.46 1.  0.31                                                                   -1
 3  Y-89   LVS
0.0   0.5-1   0.909   4.5   1   1.507   1.5-1
7.88   4.0   5.0   1   0.    0
 1.
 1.
 1.
 1.
 1.
 1.
 8.72 1.  -0.3                                                                   -1
 4  NB-91  LVS
0.0   4.5   1   0.105   0.5-1   1.187   2.5-1   1.313   1.5-1
10.26 1.  0.57                                                                   -1
 5  ZR-91  LVS
0.0   2.5   1   1.205   0.5   1   1.467   2.5   1   1.882   3.5   1   2.042   1.5   1
10.0 1.  0.9                                                                     -1
 3  Y-88   LVS
0.0   4.0-1   0.232   5.0-1   0.393   1.0   1
12.055   7.5   8.5   1   0.    0
```

```
 1.
 1.
 1.
 1.                                                                                                   -1
 8.[illegible] 1.  -[illegible]
 9  NB-90  LVS
0.0   8.0   1   0.122   6.0   1   0.125   4.0-1   0.171   7.0   1   0.285   5.0   1   0.328   4.0   1
0.362   5.0-1   0.382   1.0   1   0.651   3.0   1
10.3 1.  1.2                                                                                          -1
 2  ZR-90  LVS
0.0   0.0   1   1.761   0.0   1
 9.1 1.  0.2                                                                                          -1
 3  Y-87  LVS
0.0   0.5   1   0.381   4.5   1   0.793   2.5-1
```

APPENDIX E.

OUTPUT DATA FOR STAPRE CALCULATIONS

```
41-NB-93(N,N') (N,2N) (N,3N) EMISSION SPECTRA

ZERO.D.PARC(I,3)...IN MEV        0.000     7.230         7.230     8.830     7.883     0.000

FUER MAXIMALE EINSCHUSSENERGIE KOENNEN  4 DER VORGESEHENEN ENDKERNE GEBILDET WERDEN
DU=    0.500(MEV)


1NEUTRON TRRANSMISSION COEFF. FOR A=93,Z=41
1PROTON TRANSMISSION COEFF. FOR A=93,Z=41
1TRANSMISSION COEFFICIENTS FOR A+39-Y-89  ALPHA
```

```
==================================================================================================================================

                                                BERECHNUNG DES HAUSER-FESHBACH NENNERS
                                              -------------------------------------------



                                              ==================================
                                              = 1.COMPOUNDKERN      94.NB 41. =
                                              ==================================

EGRC=    0.000(MEV)     KGRC =    1
NIVEAUDICHTEPARAMETER
DC:    11.980      1.000     -0.760      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000 ISYMM=-1
level density parameters

               VERDAMPFUNG NEUT ABLOESEARBEIT =  7.230(MEV)    EGRR,KGRR  7.230 15
              ++++++++++++++++++
NIVEAUDICHTEPARAMETER
DR:    11.240      1.000     -0.463      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000 ISYMM=-1

DISKRETE NIVEAUS DES ENDKERNES:         LVS

 1.   0.000  4.5 1  2.   0.030  0.5-1  3.   0.686  1.5-1  4.   0.744  3.5 1  5.   0.809  2.5 1  6.   0.810  1.5-1  7.   0.950  6.5 1
 8.   0.979  5.5 1  9.   1.083  4.5 1 10.   1.296  4.5 1 11.   1.315  2.5-1 12.   1.334  8.5 1 13.   1.369  1.5 1 14.   1.395  2.5 1
15.   1.483  3.5-1 16.   1.490  8.5 1 17.   1.499  3.5-1 18.   1.546  1.5 1 19.   1.603  6.5 1 20.   1.665  1.5 1 21.   1.679  3.5 1
22.   1.683  3.5 1 23.   1.686  6.5 1 24.   1.728  1.5 1 25.   1.910  3.5-1 26.   1.914  4.5 1 27.   1.947  3.5 1 28.   1.949  2.5 1
29.   1.968  6.5 1 30.   2.002  8.5 1 31.   2.019  1.5 1 32.   2.117  8.5 1 33.   2.153  2.5-1 34.   2.162  7.5 1 35.   2.171  6.5 1

               VERDAMPFUNG PROT ABLOESEARBEIT =  6.480(MEV)    EGRR,KGRR  6.480 13
              ++++++++++++++++++
NIVEAUDICHTEPARAMETER
DR:    10.630      1.000      0.150      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000 ISYMM=-1

DISKRETE NIVEAUS DES ENDKERNES:         LVS

 1.   0.000  2.5 1  2.   0.267  1.5 1  3.   0.947  0.5 1  4.   1.018  0.5 1  5.   1.151  0.5 1  6.   1.222  0.5 1  7.   1.423  1.5 1
 8.   1.436  0.5 1  9.   1.450  1.5 1 10.   1.470  2.5 1 11.   1.477  3.5 1 12.   1.597  2.5 1 13.   1.640  1.5 1

               VERDAMPFUNG ALFA ABLOESEARBEIT =  2.190(MEV)    EGRR,KGRR  2.190  5
              ++++++++++++++++++
```

```
 1.  0.000  2.0-1  2.  0.202  3.0-1  3.  0.682  7.0 1  4.  0.777  2.0 1  5.  0.954  3.0 1  6.  1.047  5.0 1  7.  1.189  4.0 1
 8.  1.215  0.0-1  9.  1.298  6.0 1 10.  1.371  1.0-1
```

```
=================================
= 2.COMPOUNDKERN      93.NB 41. =
=================================
```

EGRC=   7.230(MEV)   KGRC = 15

GAMMA-RAY TRANSMISSIONSKOEFFIZIENTEN

ABSCHAETZUNG DER STRAHLUNGSBREITE BEI DER NEUTRONENBINDUNGSENERGIE   STREIFEN 33
MITTLERE STAHLUNGSBREITE(UB,S1,S2,KP)=   8.83 6.5 7.5 1
EXPERIMENTELLER WERT   0.00(MILLI-EV) ABSCHAETZUNG GARDNER 262.30(MILLI-EV)

ES WIRD AN DIE STRAHLUNGSBREITE NORMIERT

level density parameters

```
            VERDAMPFUNG NEUT ABLOESEARBEIT =  8.830(MEV)    EGRR,KGRR 16.060 33
           ++++++++++++++++++
NIVEAUDICHTEPARAMETER
DR:     8.920     1.000    -1.740     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000 ISYMM=-1

DISKRETE NIVEAUS DES ENDKERNES:        LVS

 1.  0.000  7.5 1  2.  0.135  2.0 1  3.  0.256  2.0-1  4.  0.286  3.0 1  5.  0.357  5.0 1  6.  0.390  3.0-1

            VERDAMPFUNG PROT ABLOESEARBEIT =  5.950(MEV)    EGRR,KGRR 13.180 27
           ++++++++++++++++++
NIVEAUDICHTEPARAMETER
DR:    10.420     1.000     0.770     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000 ISYMM=-1

DISKRETE NIVEAUS DES ENDKERNES:        LVS

 1.  0.000  0.0 1  2.  0.934  2.0 1  3.  1.382  0.0 1  4.  1.495  4.0 1  5.  1.847  2.0 1  6.  2.670  2.0 1  7.  2.150  4.0 1
 8.  2.340  3.0-1  9.  2.400  4.0 1

            VERDAMPFUNG ALFA ABLOESEARBEIT =  1.920(MEV)    EGRR,KGRR  9.150 19
           ++++++++++++++++++
NIVEAUDICHTEPARAMETER
DR:     8.460     1.000     0.310     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000 ISYMM=-1

DISKRETE NIVEAUS DES ENDKERNES:        LVS

 1.  0.000  0.5-1  2.  0.909  4.5 1  3.  1.507  1.5-1
ANZAHL DER TB-STREIFEN     36
```

```
=================================
= 3.COMPOUNDKERN      92.NB 41. =
=================================
```

EGRC= 16.060(MEV)   KGRC = 33

GAMMA-RAY TRANSMISSIONSKOEFFIZIENTEN

```
EXPERIMENTELLER WERT     0.00(MILLI-EV) ABSCHAETZUNG GARDNER  401.63(MILLI-EV)

ES WIRD AN DIE STRAHLUNGSBREITE NORMIERT

..............................................................................................................

level density parameters

               VERDAMPFUNG NEUT ABLOESEARBEIT =  7.883(MEV)    EGRR,KGRR 23.943 48
              ++++++++++++++++++
NIVEAUDICHTEPARAMETER
DR:     8.720     1.000    -0.300     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000 ISYMM=-1

DISKRETE NIVEAUS DES ENDKERNES:        LVS

 1.   0.000  4.5 1  2.   0.105  0.5-1  3.   1.187  2.5-1  4.   1.313  1.5-1

               VERDAMPFUNG PROT ABLOESEARBEIT =  5.740(MEV)    EGRR,KGRR 21.800 44
              ++++++++++++++++++
NIVEAUDICHTEPARAMETER
DR:    10.260     1.000     0.570     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000 ISYMM=-1

DISKRETE NIVEAUS DES ENDKERNES:        LVS

 1.   0.000  2.5 1  2.   1.205  0.5 1  3.   1.467  2.5 1  4.   1.882  3.5 1  5.   2.042  1.5 1

               VERDAMPFUNG ALFA ABLOESEARBEIT =  4.489(MEV)    EGRR,KGRR 20.549 42
              ++++++++++++++++++
NIVEAUDICHTEPARAMETER
DR:    10.000     1.000     0.900     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000 ISYMM=-1

DISKRETE NIVEAUS DES ENDKERNES:        LVS

 1.   0.000  4.0-1  2.   0.232  5.0-1  3.   0.393  1.0 1
ANZAHL DER TR-STREIFEN    22
                                        ----------------------------------------------



                                        ================================
                                        = 4.COMPOUNDKERN     91.NB 41. =
                                        ================================

EGRC=  23.943(MEV)     KGRC =  48

..............................................................................................................
                                        GAMMA-RAY TRANSMISSIONSKOEFFIZIENTEN

ABSCHAETZUNG DER STRAHLUNGSBREITE BEI DER NEUTRONENBINDUNGSENERGIE        STREIFEN  72
MITTLERE STAHLUNGSBREITE(UR,S1,S2,FF)=    12.06   7.5   8.5   1
EXPERIMENTELLER WERT     0.00(MILLI-EV) ABSCHAETZUNG GARDNER  724.05(MILLI-EV)

ES WIRD AN DIE STRAHLUNGSBREITE NORMIERT

..............................................................................................................

level density parameters

               VERDAMPFUNG NEUT ABLOESEARBEIT = 12.055(MEV)    EGRR,KGRR 35.998 72
              ++++++++++++++++++
NIVEAUDICHTEPARAMETER
DR:     9.000     1.000    -0.350     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000 ISYMM=-1

DISKRETE NIVEAUS DES ENDKERNES:        LVS

 1.   0.000  8.0 1  2.   0.122  6.0 1  3.   0.125  4.0-1  4.   0.171  7.0 1  5.   0.285  5.0 1  6.   0.328  4.0 1  7.   0.367  5.0-1
 8.   0.382  1.0 1  9.   0.651  3.0 1
```

```
              VERDAMPFUNG PROT ABLOESEARBEIT = [illegible]   EGRR,KGRR [illegible]
             ++++++++++++++++++
NIVEAUDICHTEPARAMETER
DR:   10.300    1.000    1.200    0.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000 ISYMM=-1

DISKRETE NIVEAUS DES ENDKERNES:      LVS

 1.  0.000  0.0 1  2.  1.761  0.0 1

              UMAX=  27.017  VERDAMPFUNG NICHT MOEGLICH


              VERDAMPFUNG ALFA ABLOESEARBEIT =  5.425(MEV)   EGRR,KGRR 29.368 59
             ++++++++++++++++++
NIVEAUDICHTEPARAMETER
DR:    9.100    1.000    0.200    0.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000    0.000 ISYMM=-1

DISKRETE NIVEAUS DES ENDKERNES:      LVS

 1.  0.000  0.5 1  2.  0.381  4.5 1  3.  0.793  2.5-1

              UMAX=  27.017  VERDAMPFUNG NICHT MOEGLICH

ANZAHL DER TB-STREIFEN     4
                                   ------------------------------------------


NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END
NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END
NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END NIVBR END
```

EINSCHUSSENERGIE IM LS 20.49MEV IM SS 20.27MEV SIGMA ABSORPTION= 0.15934E+01(BARN)

++

PRECOMPOUNDZERFALL

EMISSIONSRATEN FUER NUKLEONEN UND ALPHA-TEILCHEN NACH MILANO-GRUPPE   ALFA PREFORMATION PARAMETER= 0.180000

B AUS AP=A/B. IN P-H-ZUSTANDSDICHTEN DEL = 12./SQRT(A)

INTERNAL TRANSITIONRATES MIT KORREKTUR FUER PAULIPRINZIP
****

N	NP	NH	TRPL	TRO	TRMI	TR
3	2	1	0.619E+22	0.266E+21	0.000E+00	0.646E+22
5	3	2	0.387E+22	0.522E+21	0.124E+20	0.441E+22
7	4	3	0.266E+22	0.758E+21	0.412E+20	0.346E+22
9	5	4	0.189E+22	0.966E+21	0.961E+20	0.295E+22
11	6	5	0.136E+22	0.114E+22	0.185E+21	0.268E+22
13	7	6	0.960E+21	0.127E+22	0.317E+21	0.255E+22
15	8	7	0.659E+21	0.135E+22	0.500E+21	0.250E+22
17	9	8	0.428E+21	0.136E+22	0.742E+21	0.253E+22
19	10	9	0.254E+21	0.131E+22	0.105E+22	0.261E+22
21	11	10	0.178E+21	0.118E+22	0.144E+22	0.274E+22
23	12	11	0.456E+20	0.966E+21	0.190E+22	0.291E+22
25	13	12	0.513E+19	0.658E+21	0.246E+22	0.313E+22
27	14	13	0.000E+00	0.249E+21	0.312E+22	0.337E+22

CONTINUUM DECAYRATES
****

N= 1 WC(N) = 0.18241E+22
N= 2 WC(N) = 0.70886E+21
N= 3 WC(N) = 0.29601E+21
N= 4 WC(N) = 0.12582E+21
N= 5 WC(N) = 0.52435E+20
N= 6 WC(N) = 0.20697E+20
N= 7 WC(N) = 0.74625E+19
N= 8 WC(N) = 0.23565E+19
N= 9 WC(N) = 0.61698E+18
N=10 WC(N) = 0.12390E+18
N=11 WC(N) = 0.16935E+17
N=12 WC(N) = 0.12918E+16

```
VERZWEIGUNGSVERHAELTNISSE

 N      TRPL          TRO          TRMI          TRIN          TRCO

 1    0.748E+00    0.322E-01    0.000E+00    0.780E+00    0.220E+00
 2    0.757E+00    0.102E+00    0.242E-02    0.861E+00    0.139E+00
 3    0.708E+00    0.202E+00    0.110E-01    0.921E+00    0.789E-01
 4    0.614E+00    0.314E+00    0.312E-01    0.959E+00    0.409E-01
 5    0.496E+00    0.417E+00    0.678E-01    0.981E+00    0.192E-01
 6    0.374E+00    0.494E+00    0.124E+00    0.992E+00    0.806E-02
 7    0.262E+00    0.536E+00    0.199E+00    0.997E+00    0.297E-02
 8    0.169E+00    0.537E+00    0.293E+00    0.999E+00    0.930E-03
 9    0.970E-01    0.501E+00    0.402E+00    0.100E+01    0.236E-03
10    0.465E-01    0.430E+00    0.523E+00    0.100E+01    0.452E-04
11    0.157E-01    0.331E+00    0.653E+00    0.100E+01    0.581E-05
12    0.164E-02    0.210E+00    0.788E+00    0.100E+01    0.413E-06
13    0.000E+00    0.738E-01    0.926E+00    0.100E+01    0.114E-07

EQUILIBRATIONSKRITERIUM(PIVE= 0.100E-01)ERFUELLT
NW=  33  DX,DXH,DIFF  0.99632E+00  0.99632E+00 -0.73166E-05   FPR=  0.53911E+00

N=  1 GCH(N)=  0.25406E-08 GC(N)=  0.25087E-08 GC/GCH=  0.98746E+00  BCE(N)=  0.12500E-21    ( 42.2947 PROZ VOM PRECOMPOUNDZERF)
N=  2 GCH(N)=  0.10044E-05 GC(N)=  0.99349E-06 GC/GCH=  0.98916E+00  BCE(N)=  0.17062E-21    ( 22.4338 PROZ VOM PRECOMPOUNDZERF)
N=  3 GCH(N)=  0.80971E-04 GC(N)=  0.80214E-04 GC/GCH=  0.99065E+00  BCE(N)=  0.23180E-21    ( 12.7275 PROZ VOM PRECOMPOUNDZERF)
N=  4 GCH(N)=  0.20211E-02 GC(N)=  0.20049E-02 GC/GCH=  0.99202E+00  BCE(N)=  0.34846E-21    (  8.1323 PROZ VOM PRECOMPOUNDZERF)
N=  5 GCH(N)=  0.19360E-01 GC(N)=  0.19231E-01 GC/GCH=  0.99331E+00  BCE(N)=  0.65970E-21    (  6.4164 PROZ VOM PRECOMPOUNDZERF)
N=  6 GCH(N)=  0.80255E-01 GC(N)=  0.79819E-01 GC/GCH=  0.99458E+00  BCE(N)=  0.12978E-20    (  4.9822 PROZ VOM PRECOMPOUNDZERF)
N=  7 GCH(N)=  0.15353E+00 GC(N)=  0.15290E+00 GC/GCH=  0.99584E+00  BCE(N)=  0.17402E-20    (  2.4088 PROZ VOM PRECOMPOUNDZERF)
N=  8 GCH(N)=  0.13884E+00 GC(N)=  0.13844E+00 GC/GCH=  0.99713E+00  BCE(N)=  0.12619E-20    (  0.5516 PROZ VOM PRECOMPOUNDZERF)
N=  9 GCH(N)=  0.58559E-01 GC(N)=  0.58470E-01 GC/GCH=  0.99848E+00  BCE(N)=  0.44735E-21    (  0.0512 PROZ VOM PRECOMPOUNDZERF)
N= 10 GCH(N)=  0.10855E-01 GC(N)=  0.10854E-01 GC/GCH=  0.99989E+00  BCE(N)=  0.70922E-22    (  0.0016 PROZ VOM PRECOMPOUNDZERF)
N= 11 GCH(N)=  0.77152E-03 GC(N)=  0.77260E-03 GC/GCH=  0.10014E+01  BCE(N)=  0.43398E-23    (  0.0000 PROZ VOM PRECOMPOUNDZERF)
N= 12 GCH(N)=  0.15271E-04 GC(N)=  0.15317E-04 GC/GCH=  0.10030E+01  BCE(N)=  0.74141E-25    (  0.0000 PROZ VOM PRECOMPOUNDZERF)
N= 13 GCH(N)=  0.26907E-07 GC(N)=  0.27035E-07 GC/GCH=  0.10047E+01  BCE(N)=  0.11304E-27    (  0.0000 PROZ VOM PRECOMPOUNDZERF)

ANREGUNGSENERGIE DES COMPOSITE SYSTEM= 27.500(MEV)       MATRIXELEMENT /M/**2=0.1007E-04(MEV**2)
PREEQUILIBRIUMFRACTION=0.5391          SUMME UEBER PREEQUILIBRIUMSPEKTRUM=0.7433E+00(BARN)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++


BESETZUNG DES ERSTEN COMPOUNDKERNES    UMAX= 27.5000(MEV)  ANFANGSPIN= 0.0

PI=+1
0.596E-03 0.520E-02 0.140E-01 0.243E-01 0.370E-01 0.452E-01 0.470E-01 0.462E-01 0.433E-01 0.371E-01 0.285E-01 0.188E-01 0.687E-02
0.384E-02 0.280E-03 0.156E-03 0.136E-04 0.723E-05 0.000E+00 0.000E+00
PI=-1
0.538E-03 0.463E-02 0.126E-01 0.246E-01 0.361E-01 0.444E-01 0.463E-01 0.463E-01 0.446E-01 0.409E-01 0.339E-01 0.248E-01 0.141E-01
0.129E-02 0.722E-03 0.630E-04 0.350E-04 0.305E-05 0.161E-05 0.000E+00


                                            ********************************
                                            * 1.COMPOUNDKERN      94.NB 41. *
                                            ********************************

EGRC=    0.000(MEV)     KGRC =    1

****************************************************************************************************************************

WIDTH-FLUCTUATION CORRECTION  NU= 1  DEL= 0.0100   NINT=  64   IMAX= 6   NCHANN= 100
   J  PI       TB           FMA       KANAELE  WFC       PI       TB           FMA       KANAELE  WFC

 0.0  +1  0.15188E+09  0.88456E+00   1240              -1  0.15188E+09  0.88456E+00   1240
 1.0  +1  0.44545E+09  0.88456E+00   1300              -1  0.44545E+09  0.88456E+00   1296
 2.0  +1  0.70952E+09  0.88456E+00   1347              -1  0.70952E+09  0.88456E+00   1344
 3.0  +1  0.92793E+09  0.88456E+00   1381              -1  0.92793E+09  0.88456E+00   1380
 4.0  +1  [illegible]
```

8.0	+1	0.11313E+10	0.88456E+00	1426	-1	0.11313E+10	0.88456E+00	1431	
9.0	+1	0.10252E+10	0.88456E+00	1420	-1	0.10252E+10	0.88456E+00	1418	
10.0	+1	0.89615E+09	0.88456E+00	1399	-1	0.89615E+09	0.88456E+00	1403	^
11.0	+1	0.75665E+09	0.88456E+00	1381	-1	0.75665E+09	0.88456E+00	1379	^
12.0	+1	0.61764E+09	0.88456E+00	1351	-1	0.61764E+09	0.88456E+00	1357	^
13.0	+1	0.48764E+09	0.88456E+00	1327	-1	0.48764E+09	0.88456E+00	1328	^
14.0	+1	0.37240E+09	0.88456E+00	1294	-1	0.37240E+09	0.88456E+00	1304	
15.0	+1	0.27502E+09	0.89204E+00	1266	-1	0.27502E+09	0.89204E+00	1270	
16.0	+1	0.19627E+09	0.89204E+00	1228 ^	-1	0.19627E+09	0.89204E+00	1241	
17.0	+1	0.13486E+09	0.89204E+00	1199 ^	-1	0.13486E+09	0.89204E+00	1201	^
18.0	+1	0.88700E+08	0.89204E+00	1160	-1	0.88700E+08	0.89204E+00	1171	^

****

****

WIDTH-FLUCTUATION CORRECTION NU= 1 DEL= 0.0100 NINT= 64 IMAX= 6 NCHANN= 100

TEILCHEN IN AUSGANGSKANAELEN

SUMME UEBER PRIMAERES SPEKTRUM= 0.72747E+00(BARN)

****

PRECOMPOUND UND COMPOUNDBEITRAEGE - MISCHUNG 0.54 ZU 0.46

E(MEV)	STREIFEN	PREC(BARN)	COMP(BARN)	PR+CO(BARN)	SUMME(BARN)	PR+CO(BARN/MEV)	PR+CO(BARN/(MEV*SR)
0.250	55	0.2315E-01	0.7300E-01	0.9615E-01	0.9615E-01	0.1923E+00	0.1530E-01
0.750	54	0.3710E-01	0.1059E+00	0.1430E+00	0.2392E+00	0.2861E+00	0.2277E-01
1.250	53	0.3932E-01	0.9960E-01	0.1389E+00	0.3781E+00	0.2779E+00	0.2211E-01
1.750	52	0.4210E-01	0.9328E-01	0.1354E+00	0.5135E+00	0.2708E+00	0.2155E-01
2.250	51	0.4315E-01	0.8269E-01	0.1258E+00	0.6393E+00	0.2517E+00	0.2003E-01
2.750	50	0.4139E-01	0.6772E-01	0.1091E+00	0.7485E+00	0.2182E+00	0.1737E-01
3.250	49	0.3811E-01	0.5249E-01	0.9060E-01	0.8391E+00	0.1812E+00	0.1442E-01
3.750	48	0.3470E-01	0.3962E-01	0.7431E-01	0.9134E+00	0.1486E+00	0.1183E-01
4.250	47	0.3188E-01	0.2971E-01	0.6159E-01	0.9750E+00	0.1232E+00	0.9802E-02
4.750	46	0.2979E-01	0.2231E-01	0.5211E-01	0.1027E+01	0.1042E+00	0.8293E-02
5.250	45	0.2827E-01	0.1677E-01	0.4504E-01	0.1072E+01	0.9008E-01	0.7168E-02
5.750	44	0.2706E-01	0.1255E-01	0.3962E-01	0.1112E+01	0.7923E-01	0.6305E-02
6.250	43	0.2599E-01	0.9307E-02	0.3529E-01	0.1147E+01	0.7059E-01	0.5617E-02
6.750	42	0.2491E-01	0.6811E-02	0.3172E-01	0.1179E+01	0.6345E-01	0.5049E-02
7.250	41	0.2383E-01	0.4919E-02	0.2874E-01	0.1207E+01	0.5749E-01	0.4575E-02
7.750	40	0.2268E-01	0.3498E-02	0.2618E-01	0.1234E+01	0.5236E-01	0.4166E-02
8.250	39	0.2140E-01	0.2439E-02	0.2384E-01	0.1258E+01	0.4767E-01	0.3794E-02
8.750	38	0.2003E-01	0.1670E-02	0.2170E-01	0.1279E+01	0.4340E-01	0.3454E-02
9.250	37	0.1871E-01	0.1129E-02	0.1984E-01	0.1299E+01	0.3969E-01	0.3158E-02
9.750	36	0.1748E-01	0.7563E-03	0.1824E-01	0.1317E+01	0.3648E-01	0.2903E-02
10.250	35	0.1632E-01	0.5010E-03	0.1682E-01	0.1334E+01	0.3365E-01	0.2678E-02
10.750	34	0.1523E-01	0.3282E-03	0.1555E-01	0.1350E+01	0.3111E-01	0.2476E-02
11.250	33	0.1420E-01	0.2127E-03	0.1441E-01	0.1364E+01	0.2882E-01	0.2293E-02
11.750	32	0.1322E-01	0.1364E-03	0.1336E-01	0.1377E+01	0.2672E-01	0.2126E-02
12.250	31	0.1230E-01	0.8639E-04	0.1239E-01	0.1390E+01	0.2478E-01	0.1972E-02
12.750	30	0.1142E-01	0.5404E-04	0.1148E-01	0.1401E+01	0.2295E-01	0.1826E-02
13.250	29	0.1057E-01	0.3334E-04	0.1060E-01	0.1412E+01	0.2120E-01	0.1687E-02
13.750	28	0.9732E-02	0.2026E-04	0.9752E-02	0.1422E+01	0.1950E-01	0.1552E-02
14.250	27	0.8903E-02	0.1211E-04	0.8916E-02	0.1431E+01	0.1783E-01	0.1419E-02
14.750	26	0.8074E-02	0.7102E-05	0.8082E-02	0.1439E+01	0.1616E-01	0.1286E-02
15.250	25	0.7236E-02	0.4079E-05	0.7240E-02	0.1446E+01	0.1448E-01	0.1152E-02
15.750	24	0.6381E-02	0.2288E-05	0.6383E-02	0.1452E+01	0.1277E-01	0.1016E-02
16.750	23	0.5502E-02	0.1249E-05	0.5503E-02	0.1458E+01	0.1101E-01	0.8758E-03

18.750	18	0.5996E-03	0.2853E-07	0.5996E-03	0.1470E+01	0.1199E-02	0.9543E-04
19.250	17	0.0000E+00	0.8863E-08	0.8863E-08	0.1470E+01	0.1773E-07	0.1411E-08
19.750	16	0.0000E+00	0.2725E-08	0.2725E-08	0.1470E+01	0.5450E-08	0.4337E-09
20.250	15	0.0000E+00	0.2747E-08	0.2747E-08	0.1470E+01	0.5494E-08	0.4372E-09

0.0000E+00	0.0000E+00	0.2500E+06	0.9615E-07	0.7500E+06	0.1430E-06	4110 3 91
0.1250E+07	0.1387E-06	0.1750E+07	0.1754E-06	0.2250E+07	0.1258E-06	4110 3 91
0.2750E+07	0.1091E-06	0.3250E+07	0.9060E-07	0.3750E+07	0.7431E-07	4110 3 91
0.4250E+07	0.6159E-07	0.4750E+07	0.5211E-07	0.5250E+07	0.4504E-07	4110 3 91
0.5750E+07	0.3962E-07	0.6250E+07	0.3529E-07	0.6750E+07	0.3172E-07	4110 3 91
0.7250E+07	0.2874E-07	0.7750E+07	0.2618E-07	0.8250E+07	0.2384E-07	4110 3 91
0.8750E+07	0.2170E-07	0.9250E+07	0.1984E-07	0.9750E+07	0.1824E-07	4110 3 91
0.1025E+08	0.1682E-07	0.1075E+08	0.1555E-07	0.1125E+08	0.1441E-07	4110 3 91
0.1175E+08	0.1336E-07	0.1225E+08	0.1239E-07	0.1275E+08	0.1148E-07	4110 3 91
0.1325E+08	0.1060E-07	0.1375E+08	0.9752E-08	0.1425E+08	0.8916E-08	4110 3 91
0.1475E+08	0.8082E-08	0.1525E+08	0.7240E-08	0.1575E+08	0.6383E-08	4110 3 91
0.1625E+08	0.5503E-08	0.1675E+08	0.4594E-08	0.1725E+08	0.3652E-08	4110 3 91
0.1775E+08	0.2673E-08	0.1825E+08	0.1656E-08			
0.0000E+00	0.0000E+00	0.2500E+06	0.1308E-06	0.7500E+06	0.1946E-06	4110 5 91
0.1250E+07	0.1890E-06	0.1750E+07	0.1847E-06	0.2250E+07	0.1712E-06	4110 5 91
0.2750E+07	0.1484E-06	0.3250E+07	0.1232E-06	0.3750E+07	0.1011E-06	4110 5 91
0.4250E+07	0.8378E-07	0.4750E+07	0.7088E-07	0.5250E+07	0.6126E-07	4110 5 91
0.5750E+07	0.5389E-07	0.6250E+07	0.4801E-07	0.6750E+07	0.4315E-07	4110 5 91
0.7250E+07	0.3910E-07	0.7750E+07	0.3561E-07	0.8250E+07	0.3242E-07	4110 5 91
0.8750E+07	0.2952E-07	0.9250E+07	0.2699E-07	0.9750E+07	0.2481E-07	4110 5 91
0.1025E+08	0.2288E-07	0.1075E+08	0.2116E-07	0.1125E+08	0.1960E-07	4110 5 91
0.1175E+08	0.1817E-07	0.1225E+08	0.1685E-07	0.1275E+08	0.1561E-07	4110 5 91
0.1325E+08	0.1442E-07	0.1375E+08	0.1326E-07	0.1425E+08	0.1213E-07	4110 5 91
0.1475E+08	0.1099E-07	0.1525E+08	0.9848E-08	0.1575E+08	0.8682E-08	4110 5 91
0.1625E+08	0.7485E-08	0.1675E+08	0.6249E-08	0.1725E+08	0.4967E-08	4110 5 91
0.1775E+08	0.3636E-08	0.1825E+08	0.2252E-08			
0.0000E+00	0.0000E+00	0.2500E+06	0.1041E-07	0.7500E+06	0.1548E-07	4110 6 91
0.1250E+07	0.1504E-07	0.1750E+07	0.1465E-07	0.2250E+07	0.1362E-07	4110 6 91
0.2750E+07	0.1181E-07	0.3250E+07	0.9807E-08	0.3750E+07	0.8044E-08	4110 6 91
0.4250E+07	0.6667E-08	0.4750E+07	0.5640E-08	0.5250E+07	0.4875E-08	4110 6 91
0.5750E+07	0.4288E-08	0.6250E+07	0.3820E-08	0.6750E+07	0.3434E-08	4110 6 91
0.7250E+07	0.3111E-08	0.7750E+07	0.2834E-08	0.8250E+07	0.2580E-08	4110 6 91
0.8750E+07	0.2349E-08	0.9250E+07	0.2148E-08	0.9750E+07	0.1974E-08	4110 6 91
0.1025E+08	0.1821E-08	0.1075E+08	0.1684E-08	0.1125E+08	0.1560E-08	4110 6 91
0.1175E+08	0.1446E-08	0.1225E+08	0.1341E-08	0.1275E+08	0.1242E-08	4110 6 91
0.1325E+08	0.1147E-08	0.1375E+08	0.1056E-08	0.1425E+08	0.9650E-09	4110 6 91
0.1475E+08	0.8748E-09	0.1525E+08	0.7837E-09	0.1575E+08	0.6909E-09	4110 6 91
0.1625E+08	0.5957E-09	0.1675E+08	0.4973E-09	0.1725E+08	0.3953E-09	4110 6 91
0.1775E+08	0.2893E-09	0.1825E+08	0.1792E-09			

****
* 2.COMPOUNDKERN   93.NR 41. *
****

EGRC= 7.230(MEV) IGRC = 15

RESETZUNG DER NIVEAUS DURCH TEILCHENZERFALL

1.	0.000	4.5 10.223E-08(BARN)	2.	0.030	0.5-10.517E-09(BARN)	3.	0.686	1.5-10.963E-09(BARN)	4.	0.744	3.5 10.176E-08(BARN)
5.	0.809	2.5 10.138E-08(BARN)	6.	0.810	1.5-10.947E-09(BARN)	7.	0.950	6.5 10.232E-08(BARN)	8.	0.979	5.5 10.271E-08(BARN)
9.	1.083	4.5 10.201E-08(BARN)	10.	1.296	4.5 10.422E-04(BARN)	11.	1.315	2.5-10.284E-04(BARN)	12.	1.374	8.5 10.460E-04(BARN)
13.	1.369	1.5 10.194E-04(BARN)	14.	1.395	2.5 10.375E-04(BARN)	15.	1.483	3.5-10.448E-04(BARN)	16.	1.490	8.5 10.573E-04(BARN)
17.	1.499	3.5 10.447E-04(BARN)	18.	1.546	1.5 10.243E-04(BARN)	19.	1.603	6.5 10.597E-04(BARN)	20.	1.665	1.5 10.243E-04(BARN)
21.	1.677	3.5 10.447E-04(BARN)	22.	1.683	3.5 10.447E-04(BARN)	23.	1.686	4.5 10.595E-04(BARN)	24.	1.729	1.5 10.242E-04(BARN)
25.	1.910	3.5-10.210E-08(BARN)	26.	1.914	4.5 10.246E-08(BARN)	27.	1.947	3.5 10.211E-08(BARN)	28.	1.949	2.5 10.166E-08(BARN)
29.	1.968	6.5 10.281E-08(BARN)	30.	2.002	8.5 10.268E-08(BARN)	31.	2.019	1.5 10.114E-08(BARN)	32.	2.117	8.5 10.267E-08(BARN)
33.	2.153	2.5-10.164E-08(BARN)	34.	2.162	7.5 10.278E-08(BARN)	35.	2.171	6.5 10.279E-08(BARN)			

SUMME DER BESETZUNGEN DER NIVEAUS 0.5996E-03(BARN)

9.	1.083	4.5	10.389E-02(BARN)	10.	1.296	4.5	10.285E-02(BARN)	11.	1.315	2.5-	10.238E-02(BARN)	12.	1.334	8.5	10.132E-01(BARN)
13.	1.369	1.5	10.955E-03(BARN)	14.	1.395	2.5	10.129E-02(BARN)	15.	1.483	3.5-	10.368E-02(BARN)	16.	1.490	8.5	10.900E-02(BARN)
17.	1.499	3.5-	10.357E-02(BARN)	18.	1.546	1.5	10.722E-03(BARN)	19.	1.603	6.5	10.375E-02(BARN)	20.	1.665	1.5	10.593E-03(BARN)
21.	1.679	3.5	10.113E-02(BARN)	22.	1.683	3.5	10.113E-02(BARN)	23.	1.686	6.5	10.314E-02(BARN)	24.	1.728	1.5	10.533E-03(BARN)
25.	1.910	3.5-	10.147E-02(BARN)	26.	1.914	4.5	10.944E-03(BARN)	27.	1.947	3.5	10.677E-03(BARN)	28.	1.949	2.5	10.489E-03(BARN)
29.	1.968	6.5	10.159E-02(BARN)	30.	2.002	8.5	10.216E-02(BARN)	31.	2.019	1.5	10.299E-03(BARN)	32.	2.117	8.5	10.155E-02(BARN)
33.	2.153	2.5	10.471E-03(BARN)	34.	2.162	7.5	10.128E-02(BARN)	35.	2.171	6.5	10.975E-03(BARN)				

SUMME DER BESETZUNGEN DER NIVEAUS 0.11178E+00(BARN)

IM KONTINUUM HAENGEN 0.35083E-07(BARN)

BESETZUNG DER STABILEN UND ISOMEREN NIVEAUS

NR	E	S	P	BARN
1	0.000	4.5	1	0.1118E+00

GAMMAPRODUKTIONSSPEKTRUM

E(MEV)	BARN	BARN/MEV	BARN/(MEV*SR)
0.25	0.1307E+00	0.2614E+00	0.2080E-01
0.75	0.1308E+00	0.2616E+00	0.2082E-01
1.25	0.6399E-01	0.1280E+00	0.1018E-01
1.75	0.5734E-01	0.1147E+00	0.9125E-02
2.25	0.4394E-01	0.8787E-01	0.6993E-02
2.75	0.3493E-01	0.6986E-01	0.5559E-02
3.25	0.2326E-01	0.4652E-01	0.3702E-02
3.75	0.1521E-01	0.3043E-01	0.2421E-02
4.25	0.9611E-02	0.1922E-01	0.1530E-02
4.75	0.5840E-02	0.1168E-01	0.9294E-03
5.25	0.3411E-02	0.6823E-02	0.5429E-03
5.75	0.1913E-02	0.3827E-02	0.3045E-03
6.25	0.1028E-02	0.2055E-02	0.1636E-03
6.75	0.5414E-03	0.1083E-02	0.8617E-04
7.25	0.3061E-03	0.6122E-03	0.4872E-04
7.75	0.1819E-03	0.3639E-03	0.2895E-04
8.25	0.1055E-03	0.2111E-03	0.1680E-04
8.75	0.6555E-04	0.1311E-03	0.1043E-04
9.25	0.4290E-04	0.8579E-04	0.6827E-05
9.75	0.2782E-04	0.5563E-04	0.4427E-05
10.25	0.1944E-04	0.3887E-04	0.3093E-05
10.75	0.1338E-04	0.2675E-04	0.2129E-05
11.25	0.9054E-05	0.1811E-04	0.1441E-05
11.75	0.6023E-05	0.1205E-04	0.9586E-06
12.25	0.3934E-05	0.7868E-05	0.6261E-06
12.75	0.2520E-05	0.5041E-05	0.4011E-06
13.25	0.1581E-05	0.3163E-05	0.2517E-06
13.75	0.9700E-06	0.1940E-05	0.1544E-06
14.25	0.5803E-06	0.1161E-05	0.9235E-07
14.75	0.3375E-06	0.6749E-06	0.5371E-07
15.25	0.1899E-06	0.3799E-06	0.3023E-07
15.75	0.1029E-06	0.2058E-06	0.1638E-07
16.25	0.5327E-07	0.1065E-06	0.8479E-08
16.75	0.2610E-07	0.5219E-07	0.4153E-08
17.25	0.1183E-07	0.2366E-07	0.1882E-08
17.75	0.4949E-08	0.9898E-08	0.7876E-09
18.25	0.2214E-08	0.4428E-08	0.3524E-09
18.75	0.1082E-08	0.2163E-08	0.1721E-09
19.25	0.4050E-09	0.8100E-09	0.6446E-10
19.75	0.1226E-09	0.2452E-09	0.1952E-10
20.25	0.3971E-10	0.7941E-10	0.6319E-11

DER AKTIVIERUNGSQUERSCHNITT FUER 93.NB 41.BETRAEGT 0.11534E+00BARN

E(MEV)	BARN	BARN/MEV	BARN/(MEV*SR)	SUMME(BARN)
0.25	0.2329E+00	0.4657E+00	0.3706E-01	0.23286E+00
0.75	0.2554E+00	0.5108E+00	0.4065E-01	0.48827E+00
1.25	0.2154E+00	0.4309E+00	0.3429E-01	0.70371E+00
1.75	0.1766E+00	0.3533E+00	0.2811E-01	0.88034E+00
2.25	0.1391E+00	0.2781E+00	0.2213E-01	0.10194E+01
2.75	0.1018E+00	0.2036E+00	0.1620E-01	0.11212E+01
3.25	0.7052E-01	0.1410E+00	0.1122E-01	0.11917E+01
3.75	0.4730E-01	0.9460E-01	0.7528E-02	0.12390E+01
4.25	0.3132E-01	0.6264E-01	0.4984E-02	0.12703E+01
4.75	0.2063E-01	0.4126E-01	0.3284E-02	0.129 0E+01
5.25	0.1351E-01	0.2703E-01	0.2151E-02	0.13045E+01
5.75	0.8747E-02	0.1749E-01	0.1392E-02	0.13132E+01
6.25	0.5559E-02	0.1112E-01	0.8848E-03	0.13188E+01
6.75	0.3448E-02	0.6896E-02	0.5488E-03	0.13222E+01
7.25	0.2080E-02	0.4159E-02	0.3310E-03	0.13243E+01
7.75	0.1213E-02	0.2427E-02	0.1931E-03	0.13255E+01
8.25	0.6787E-03	0.1357E-02	0.1080E-03	0.13262E+01
8.75	0.3611E-03	0.7222E-03	0.5747E-04	0.13266E+01
9.25	0.1815E-03	0.3629E-03	0.2888E-04	0.13267E+01
9.75	0.8485E-04	0.1697E-03	0.1350E-04	0.13267E+01
10.25	0.3575E-04	0.7151E-04	0.5690E-05	0.13267E+01
10.75	0.1208E-04	0.2415E-04	0.1922E-05	0.13267E+01
11.25	0.2163E-05	0.4325E-05	0.3442E-06	0.13267E+01

```
 0.0000E+00  0.0000E+00  0.2500E+06  0.2329E-06  0.7500E+06  0.2554E-064110 3 16
0.1250E+07  0.2154E-06  0.1750E+07  0.1766E-06  0.2250E+07  0.1391E-064110 3 16
0.2750E+07  0.1018E-06  0.3250E+07  0.7052E-07  0.3750E+07  0.4730E-074110 3 16
0.4250E+07  0.3132E-07  0.4750E+07  0.2063E-07  0.5250E+07  0.1351E-074110 3 16
0.5750E+07  0.8747E-08  0.6250E+07  0.5559E-08  0.6750E+07  0.3448E-084110 3 16
0.7250E+07  0.2080E-08  0.7750E+07  0.1213E-08  0.8250E+07  0.6787E-094110 3 16
0.8750E+07  0.3611E-09  0.9250E+07  0.1815E-09
 0.0000E+00  0.0000E+00  0.2500E+06  0.3510E-06  0.7500E+06  0.3850E-064110 5 16
0.1250E+07  0.3248E-06  0.1750E+07  0.2663E-06  0.2250E+07  0.2096E-064110 5 16
0.2750E+07  0.1534E-06  0.3250E+07  0.1063E-06  0.3750E+07  0.7130E-074110 5 16
0.4250E+07  0.4721E-07  0.4750E+07  0.3110E-07  0.5250E+07  0.2037E-074110 5 16
0.5750E+07  0.1319E-07  0.6250E+07  0.8380E-08  0.6750E+07  0.5198E-084110 5 16
0.7250E+07  0.3135E-08  0.7750E+07  0.1829E-08  0.8250E+07  0.1023E-084110 5 16
0.8750E+07  0.5444E-09  0.9250E+07  0.2735E-09
 0.0000E+00  0.0000E+00  0.2500E+06  0.2793E-07  0.7500E+06  0.3064E-074110 6 16
0.1250E+07  0.2584E-07  0.1750E+07  0.2119E-07  0.2250E+07  0.1668E-074110 6 16
0.2750E+07  0.1221E-07  0.3250E+07  0.8460E-08  0.3750E+07  0.5674E-084110 6 16
0.4250E+07  0.3757E-08  0.4750E+07  0.2475E-08  0.5250E+07  0.1621E-084110 6 16
0.5750E+07  0.1049E-08  0.6250E+07  0.6669E-09  0.6750E+07  0.4136E-094110 6 16
0.7250E+07  0.2495E-09  0.7750E+07  0.1456E-09  0.8250E+07  0.8142E-104110 6 16
0.8750E+07  0.4332E-10  0.9250E+07  0.2177E-10
```

```
***********************************
* 3.COMPOUNDKERN      92.NB 41.  *
***********************************
```

EGRC= 16.060(MEV)   KGRC = 33

BESETZUNG DER NIVEAUS DURCH TEILCHENZERFALL

```
 1.   0.000   7.5 10.129E-01(BARN)  2.   0.135   2.0 10.295E-02(BARN)  3.   0.256   2.0-10.237E-02(BARN)  4.   0.286   3.0 10.316E-02(BARN)
 5.   0.357   5.0 10.501E-02(BARN)  6.   0.390   3.0-10.277E-02(BARN)
SUMME DER BESETZUNGEN DER NIVEAUS 0.29147E-01(BARN)
```

BESETZUNG DER NIVEAUS DURCH GAMMAKASKADEN AUS DEM KONTINUUM

```
 1.   0.000   7.5 10.496E+00(BARN)  2.   0.135   2.0 10.500E-01(BARN)  3.   0.256   2.0-10.444E-01(BARN)  4.   0.286   3.0 10.650E-01(BARN)
 5.   0.357   5.0 10.162E+00(BARN)  6.   0.390   3.0-10.647E-01(BARN)
SUMME DER BESETZUNGEN DER NIVEAUS 0.88170E+00(BARN)
```

BESETZUNG DER NIVEAUS DURCH GAMMAKASKADEN AUS DEM KONTINUUM

1. 0.000 4.5 10.212E+00(BARN) 2. 0.105 0.5-10.181E-01(BARN) 3. 1.187 2.5-10.123E-01(BARN) 4. 1.313 1.5-10.386E-02(BARN)
SUMME DER BESETZUNGEN DER NIVEAUS 0.24586E+00(BARN)

IM KONTINUUM HAENGEN 0.47178E 01(BARN)

BESETZUNG DER STABILEN UND ISOMEREN NIVEAUS

NR	E	S	P	BARN
1	0.000	4.5	1	0.2459E+00

GAMMAPRODUKTIONSSPEKTRUM

E(MEV)	BARN	BARN/MEV	BARN/(MEV*SR)
0.25	0.2746E-01	0.5491E-01	0.4370E-02
0.75	0.1238E-01	0.2477E-01	0.1971E-02
1.25	0.1874E-01	0.3748E-01	0.2982E-02
1.75	0.2460E-01	0.4920E-01	0.3915E-02
2.25	0.6940E-02	0.1388E-01	0.1105E-02
2.75	0.1227E-02	0.2454E-02	0.1953E-03
3.25	0.1623E-03	0.3246E-03	0.2583E-04
3.75	0.8581E-05	0.1716E-04	0.1366E-05

DER AKTIVIERUNGSQUERSCHNITT FUER 91.NB 41.BETRAEGT 0.29303E+00BARN

ENDERGEBNIS

41-NB-93(N,N') (N,2N) (N,3N) EMISSION SPECTRA

EINSCHUSSENERGIE IM LS 20.49MEV IM SS 20.27MEV SIGMA ABSORPTION= 0.15934E+01(BARN)
SIGMA COMPOUND-ELASTIC= 0.22307E-08BARN

NGACOM = 2 LLMAX = 2
FM = 230.0 FREEQ.FR. = 0.539 NPI = 2 NHI = 1

DER AKTIVIERUNGSQUERSCHNITT FUER 93.NB 41.BETRAEGT 0.11536E+00(BARN)
DER AKTIVIERUNGSQUERSCHNITT FUER 92.NB 41.BETRAEGT 0.10333E+01(BARN)
DER AKTIVIERUNGSQUERSCHNITT FUER 91.NB 41.BETRAEGT 0.29303E+00(BARN)

PRODUKTIONSSPEKTREN FUER DIE GESAMTE VERDAMPFUNGSKASKADE

E (MEV)	PHOTONEN (BARN/MEV)	NEUT (BAR	PROT N/ME	ALFA V)
0.2500E+00	0.1711E+01	0.8845E+00	0.0000E+00	0.0000E+00
0.7500E+00	0.1641E+01	0.9620E+00	0.0000E+00	0.0000E+00
0.1250E+01	0.9994E+00	0.8211E+00	0.0000E+00	0.0000E+00
0.1750E+01	0.8758E+00	0.6802E+00	0.0000E+00	0.0000E+00
0.2250E+01	0.6958E+00	0.5496E+00	0.0000E+00	0.0000E+00
0.2750E+01	0.5462E+00	0.4272E+00	0.0000E+00	0.0000E+00
0.3250E+01	0.4080E+00	0.3231E+00	0.0000E+00	0.0000E+00
0.3750E+01	0.2940E+00	0.2433E+00	0.0000E+00	0.0000E+00
0.4250E+01	0.2039E+00	0.1858E+00	0.0000E+00	0.0000E+00
0.4750E+01	0.1359E+00	0.1455E+00	0.0000E+00	0.0000E+00
0.5250E+01	0.8689E-01	0.1171E+00	0.0000E+00	0.0000E+00
0.5750E+01	0.5311E-01	0.9673E-01	0.0000E+00	0.0000E+00
0.6250E+01	0.3076E-01	0.8170E-01	0.0000E+00	0.0000E+00

NR	E	S	P	BARN
1	0.000	7.5	1	0.8819E+00

GAMMAPRODUKTIONSSPEKTRUM

E(MEV)	BARN	BARN/MEV	BARN/(MEV*SR)
0.25	0.6975E+00	0.1395E+01	0.1110E+00
0.75	0.6774E+00	0.1355E+01	0.1078E+00
1.25	0.4170E+00	0.8339E+00	0.6636E-01
1.75	0.3559E+00	0.7119E+00	0.5665E-01
2.25	0.2970E+00	0.5941E+00	0.4727E-01
2.75	0.2369E+00	0.4739E+00	0.3771E-01
3.25	0.1806E+00	0.3611E+00	0.2874E-01
3.75	0.1318E+00	0.2636E+00	0.2098E-01
4.25	0.9232E-01	0.1846E+00	0.1469E-01
4.75	0.6209E-01	0.1242E+00	0.9882E-02
5.25	0.4003E-01	0.8007E-01	0.6372E-02
5.75	0.2464E-01	0.4928E-01	0.3922E-02
6.25	0.1435E-01	0.2871E-01	0.2284E-02
6.75	0.7787E-02	0.1557E-01	0.1239E-02
7.25	0.3809E-02	0.7617E-02	0.6062E-03
7.75	0.1435E-02	0.2870E-02	0.2284E-03
8.25	0.4451E-03	0.8903E-03	0.7085E-04
8.75	0.1027E-03	0.2054E-03	0.1634E-04
9.25	0.1556E-04	0.3112E-04	0.2476E-05
9.75	0.3363E-05	0.6726E-05	0.5353E-06
10.25	0.7161E-06	0.1432E-05	0.1140E-06
10.75	0.1198E-06	0.2396E-06	0.1907E-07
11.25	0.9602E-08	0.1920E-07	0.1528E-08

DER AKTIVIERUNGSQUERSCHNITT FUER 92.NB 41.BETRAEGT 0.10333E+01BARN

NEUTSPEKTRUM NACH DEM ZERFALL VON 92.NB 41.

E(MEV)	BARN	BARN/MEV	BARN/(MEV*SR)	SUMME(BARN)
0.25	0.1132E+00	0.2265E+00	0.1802E-01	0.11323E+00
0.75	0.8253E-01	0.1651E+00	0.1314E-01	0.19576E+00
1.25	0.5617E-01	0.1123E+00	0.8940E-02	0.25193E+00
1.75	0.2806E-01	0.5613E-01	0.4466E-02	0.27999E+00
2.25	0.9906E-02	0.1981E-01	0.1577E-02	0.27999E+00
2.75	0.2700E-02	0.5401E-02	0.4298E-03	0.27999E+00
3.25	0.4101E-03	0.8203E-03	0.6528E-04	0.27999E+00
3.75	0.2217E-04	0.4433E-04	0.3528E-05	0.27999E+00

```
 0.0000E+00  0.0000E+00  0.2500E+06  0.1132E-06  0.7500E+06  0.8253E-074110 3 16
0.1250E+07  0.5617E-07  0.1750E+07  0.2806E-07
 0.0000E+00  0.0000E+00  0.2500E+06  0.8088E-06  0.7500E+06  0.5895E-064110 5 16
0.1250E+07  0.4012E-06  0.1750E+07  0.2005E-06
 0.0000E+00  0.0000E+00  0.2500E+06  0.6436E-07  0.7500E+06  0.4691E-074110 6 16
0.1250E+07  0.3193E-07  0.1750E+07  0.1595E-07
```

```
**********************************
* 4.COMPOUNDKERN      91.NB 41. *
**********************************
```

EGRC= 33.943(MEV)   KGRC = 48

BESETZUNG DER NIVEAUS DURCH TEILCHENZERFALL

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0.8750E+01	0.3365E-03	0.4412E-01	0.0000E+00	0.0000E+00
0.9250E+01	0.1169E-03	0.4005E-01	0.0000E+00	0.0000E+00
0.9750E+01	0.6236E-04	0.3665E-01	0.0000E+00	0.0000E+00
0.1025E+02	0.4031E-04	0.3372E-01	0.0000E+00	0.0000E+00
0.1075E+02	0.2699E-04	0.3113E-01	0.0000E+00	0.0000E+00
0.1125E+02	0.1813E-04	0.2882E-01	0.0000E+00	0.0000E+00
0.1175E+02	0.1205E-04	0.2672E-01	0.0000E+00	0.0000E+00
0.1225E+02	0.7868E-05	0.2478E-01	0.0000E+00	0.0000E+00
0.1275E+02	0.5041E-05	0.2295E-01	0.0000E+00	0.0000F+00
0.1325E+02	0.3163E-05	0.2120E-01	0.0000E+00	0.0000E+00
0.1375E+02	0.1940E-05	0.1950E-01	0.0000E+00	0.0000E+00
0.1425E+02	0.1161E-05	0.1783E-01	0.0000E+00	0.0000E+00
0.1475E+02	0.6749E-06	0.1616E-01	0.0000E+00	0.0000E+00
0.1525E+02	0.3799E-06	0.1448E-01	0.0000E+00	0.0000E+00
0.1575E+02	0.2058E-06	0.1277E-01	0.0000E+00	0.0000E+00
0.1625E+02	0.1065E-06	0.1101E-01	0.0000E+00	0.0000E+00
0.1675E+02	0.5219E-07	0.9188E-02	0.0000E+00	0.0000E+00
0.1725E+02	0.2366E-07	0.7303E-02	0.0000E+00	0.0000E+00
0.1775E+02	0.9898E-08	0.5346E-02	0.0000E+00	0.0000E+00
0.1825E+02	0.4428E-08	0.3312E-02	0.0000E+00	0.0000E+00
0.1875E+02	0.2163E-08	0.1199E-02	0.0000E+00	0.0000E+00
0.1925E+02	0.8100E-09	0.1773E-07	0.0000E+00	0.0000E+00
0.1975E+02	0.2452E-09	0.5450E-08	0.0000E+00	0.0000E+00
0.2025E+02	0.7941E-10	0.5494E-08	0.0000E+00	0.0000E+00

EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
NNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNN
DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD

++++++++++++++++++