Principal cross sections

![Graph showing cross sections vs. energy.](image)

- **Total**
- **Absorption**
- **Elastic**
- **Gamma production**

**Energy (MeV)**

**Cross section (barns)**
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
resonance total cross section
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
resonance total cross section

![Graph showing the total cross section as a function of energy. The x-axis represents energy in MeV, ranging from $10^{-2}$ to $10^{-1}$, and the y-axis represents cross section in barns, ranging from $10^{0}$ to $10^{1}$. The graph features two prominent peaks, indicating resonances.]
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
resonance total cross section

![Graph showing total cross section vs. energy (MeV)]
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
resonance total cross section

Cross section (barns)

Energy (MeV)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
resonance absorption cross sections

![Graph showing resonance absorption cross sections](image-url)

- **X-axis:** Energy (MeV)
- **Y-axis:** Cross section (barns)

The graph illustrates the capture cross section as a function of energy. The data is presented in a logarithmic scale.
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
resonance absorption cross sections

capture
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
resonance absorption cross sections
Capture cross section for 13-AL-27.

Energy (MeV) vs. Cross section (barns) plot.

- The x-axis represents energy in MeV, ranging from $10^0$ to $10^1$.
- The y-axis represents cross section in barns, ranging from $10^{-3}$ to $10^0$.

The plot shows a decreasing trend in cross section with increasing energy.
Damage

Energy (MeV)

Damage (MeV-barns)
Non-threshold reactions

Energy (MeV) vs. Cross section (barns) graph for (n,gamma) reaction.
Principal cross sections

Cross section (barns)

Energy (MeV)

- total
- absorption
- elastic
- gamma production
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+

Heating

Heating (MeV/reaction) vs. Energy (MeV)
Non-threshold reactions

Cross section (barns)

Energy (MeV)

10^{-3}

10^{-4}

(n,gma)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
Inelastic levels

Energy (MeV)

Cross section (barns)

- (n,n*1)
- (n,n*2)
- (n,n*3)
- (n,n*4)
- (n,n*5)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
Inelastic levels

Cross section (barns) vs. Energy (MeV)

- (n,n*6) - black line
- (n,n*7) - red line
- (n,n*8) - green line
- (n,n*9) - blue line
- (n,n*10) - magenta line
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
Inelastic levels

Cross section (barns)

Energy (MeV)

(n,n*11)
(n,n*12)
(n,n*13)
(n,n*14)
(n,n*15)
Inelastic levels

13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+

Energy (MeV)

Cross section (barns)

- (n,n*16)
- (n,n*17)
- (n,n*18)
- (n,n*19)
- (n,n*20)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
Inelastic levels

Energy (MeV)

Cross section (barns)

(n,n*21)
(n,n*22)
(n,n*23)
(n,n*24)
(n,n*25)
Inelastic levels

Cross section (barns)

Energy (MeV)

(n,n\textsuperscript{26})
(n,n\textsuperscript{27})
(n,n\textsuperscript{28})
(n,n\textsuperscript{29})
(n,n\textsuperscript{30})
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
Inelastic levels

Cross section (barns)

Energy (MeV)

(n,n*31)
(n,n*32)
(n,n*33)
(n,n*34)
(n,n*35)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
Inelastic levels

Cross section (barns)

Energy (MeV)
Threshold reactions

Cross section (barns) vs Energy (MeV)

Reactions:
- \((n,n^*)t\)
- \((n,npa)\)
- \((n,n^*c)\)
- \((n,p)\)
- \((n,d)\)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
Threshold reactions

Energy (MeV)

Cross section (barns)

- (n,p*)
  - (n,p*1)
  - (n,p*2)
  - (n,p*3)
  - (n,p*4)
  - (n,p*5)

Energy (MeV)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
Threshold reactions

Energy (MeV)

Cross section (barns)

(n,d^0)
(n,d^1)
(n,d^2)
(n,d^3)
(n,d^4)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
Threshold reactions

Cross section (barns) vs. Energy (MeV) diagram with curves for different reactions:
- (n,d*5)
- (n,d*6)
- (n,d*7)
- (n,d*8)
- (n,d*9)
Threshold reactions

Cross section (barns) vs. Energy (MeV)

- (n,d*10)
- (n,d*11)
- (n,d*12)
- (n,d*13)
- (n,d*14)
Threshold reactions

Cross section (barns) vs. Energy (MeV)

- (n,d*c)
- (n,t*0)
- (n,τ*1)
- (n,t*2)
- (n,t*3)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
Threshold reactions

Cross section (barns) vs. Energy (MeV)

- $^1\text{(n,t}^4\text{)}$
- $^2\text{(n,t}^5\text{)}$
- $^3\text{(n,t}^6\text{)}$
- $^4\text{(n,t}^7\text{)}$
- $^5\text{(n,t}^8\text{)}$
Threshold reactions

Cross section (barns) vs. Energy (MeV)

- (n,t*9)
- (n,t*10)
- (n,t*c)
- (n,a*0)
- (n,a*1)
Threshold reactions

Cross section (barns) vs. Energy (MeV)

- (n,a*)2
- (n,a*)3
- (n,a*)4
- (n,a*)5
- (n,a*)6
Threshold reactions

Cross section (barns)

Energy (MeV)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
Threshold reactions

![Graph showing cross section versus energy for different reactions (n,a*12), (n,a*13), (n,a*14), (n,a*15), (n,a*16). The x-axis represents energy in MeV, and the y-axis represents cross section in barns. Peaks are observed at different energies for each reaction, indicating threshold behavior.]
Threshold reactions

Cross section (barns)

Energy (MeV)

(n,a^{*17})
(n,a^{*18})
(n,a^{*19})
(n,a^{*c})
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
angular distribution for elastic
angular distribution for elastic
angular distribution for (n,n*1)
angular distribution for $(n, n^2)$
angular distribution for (n,n*3)
angular distribution for \((n,n^*4)\)
angular distribution for \((n,n*5)\)
angular distribution for \( (n,n^*6) \)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
angular distribution for (n,n*7)
angular distribution for (n,n*8)
angular distribution for (n,n*9)
Angular distribution for \((n,n^{*}10)\)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
angular distribution for (n,n*11)
angular distribution for \((n,n^{*12})\)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
angular distribution for (n,n*13)
angular distribution for (n,n*14)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
angular distribution for (n,n*15)
angular distribution for (n,n*16)
angular distribution for \((n,n^{*17})\)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
angular distribution for (n,n*18)
angular distribution for (n,n*19)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
angular distribution for (n,n*20)
angular distribution for (n,n*21)
angular distribution for (n,n*22)
angular distribution for (n,n*23)
angular distribution for (n,n*24)
angular distribution for (n,n*25)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
angular distribution for (n,n*26)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
angular distribution for (n,n*27)
angular distribution for (n,n*28)
angular distribution for (n,n*29)
angular distribution for (n,n*30)
angular distribution for (n,n*31)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
angular distribution for (n,n*32)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
angular distribution for (n,n*33)
angular distribution for (n,n*34)
angular distribution for (n,n*35)
angular distribution for (n,n*36)
Angular distribution for (n,n*37)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
angular distribution for (n,n*38)
angular distribution for \((n,n^*39)\)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
Neutron emission for (n,x)
Neutron emission for (n,2n)
Neutron emission for (n,n*)a
Neutron emission for \((n,n^*)p\)
Neutron emission for (n,n*)d
Neutron emission for (n,n*)t
Neutron emission for (n,n*c)
Photon emission for \((n,\gamma_{\text{ma}})\)
Photon emission for (n,x)
Photon emission for (n,2n)
Photon emission for \((n,n^*)a\)
Photon emission for (n,n*)p
Photon emission for \((n,n^*)d\)
Photon emission for \((n, n^*)t\)
Photon emission for (n,n*1)
Photon emission for (n,n*2)
Photon emission for (n,n*3)
Photon emission for (n,n*5)
Photon emission for (n,n*8)
Photon emission for (n,n*9)
Photon emission for (n,n*10)
Photon emission for (n,n*11)
Photon emission for (n,n*12)
Photon emission for (n,n*13)
Photon emission for (n,n*14)
Photon emission for (n,n*15)
Phonon emission for \((n,n^{*16})\)
Photon emission for (n,n*17)
Photon emission for \((n,n^{18})\)
Photon emission for (n,n^*19)
Photon emission for (n,n*20)
Photon emission for (n,n*21)
Photon emission for (n,n^*22)
Photon emission for (n,n*23)
Photon emission for (n,n*24)

- Probl/MeV
- $E_{\gamma}$ (MeV)
- $E_n$ (MeV)
Photon emission for \((n,n^{*25})\)
Photon emission for (n,n°26)
Photon emission for $(n,n^{*27})$.
Photon emission for (n,n*28)
Photon emission for (n,n*29)
Photon emission for \((n,n'\cdot30)\)
Photon emission for (n,n*31)

Energy spectrum for (n,n*31) interaction.
Photon emission for (n,n*32)
Photon emission for (n,n'33)
Photon emission for (n,n*34)
Photon emission for (n,n*35)
Photon emission for (n,n*36)
Photon emission for (n,n*37)
Photon emission for (n,n*38)
Photon emission for (n,n*39)
Photon emission for \((n,n^*c)\)
Photon emission for (n,2a)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
Photon emission for (n,2p)

\[ E_{\gamma} (\text{MeV}) \]

\[ E_{n} (\text{MeV}) \]

\[ \text{Prob/MeV} \]

\[ 10^{-1} \]

\[ 10^{-3} \]

\[ 0.0 \]

\[ 0.2 \]

\[ 0.4 \]

\[ 0 \]

\[ 20 \]

\[ 40 \]

\[ 60 \]

\[ 80 \]

\[ 100 \]

\[ 120 \]

\[ 140 \]

\[ 160 \]
Photon emission for (n,pa)
Photon emission for (n,da)
Photon emission for (n,p*1)
Photon emission for (n,p*2)
Photon emission for \( (n,p^3) \)
Photon emission for (n,p*4)
Photon emission for (n,p*5)
Photon emission for \((n,p^*6)\)
Photon emission for (n,p*7)
Photon emission for (n,p*8)
Photon emission for (n,p*9)
Photon emission for (n,p*10)
Photon emission for (n,p^11)
Photon emission for (n,p*12)
Photon emission for (n,p*13)
Photon emission for (n,p*14)
Photon emission for (n,p*15)
Photon emission for (n,p*16)
Photon emission for (n,p*17)
Photon emission for (n,p*18)
Photon emission for (n,p*19)
Photon emission for (n,p*c)
Photon emission for (n,d*1)
Photon emission for (n,d*2)
Photon emission for (n,d*3)
Photon emission for (n,d*4)
Photon emission for (n,d*5)
Photon emission for (n,d*6)
Photon emission for (n,d*7)
Photon emission for (n,d*8)
Photon emission for (n,d*9)
Photon emission for (n,d*10)
Photon emission for \( (n,d^{*11}) \)
Photon emission for (n,d*12)
Photon emission for (n,d*13)
Photon emission for (n,d*14)
Photon emission for (n,d*15)
Photon emission for (n,d*16)
Photon emission for (n,d*17)
Photon emission for (n,d*18)
Photon emission for (n,d^{19})
Photon emission for \((n,d^*c)\)
Photon emission for (n,t*1)
Photon emission for \( (n,t^*2) \)
Photon emission for (n,t*3)
Photon emission for (n,t*4)
Photon emission for (n,t*5)
Photon emission for (n,t*6)
Photon emission for (n,t*7)
Photon emission for \((n, t^8)\)
Photon emission for (n,t*9)
Photon emission for \((n,t*10)\)
Photon emission for (n,t*c)
Photon emission for (n,a*1)
Photon emission for (n,a*2)
Photon emission for (n, a*3)
Photon emission for (n,a*4)
Photon emission for (n,a*5)
Photon emission for (n,a*6)
Photon emission for (n,a*7)
Photon emission for (n,a*8)

Prob/MeV

$E_Y$ (MeV)  $E_n$ (MeV)

10^{-2}  10^{0}  10^{2}
Photon emission for (n,a*9)
Photon emission for (n,a*10)
Photon emission for (n,a*11)
Photon emission for (n,a*12)
Photon emission for (n,a*13)
Photon emission for (n,a*14)

![Graph showing photon emission for (n,a*14)](image-url)
Photon emission for (n,a*15)
Photon emission for (n,a*16)
Photon emission for \((n,a^*17)\)
Photon emission for (n,a*18)
Photon emission for (n,a*19)
Photon emission for $(n,a^*c)$
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
thermal capture photon spectrum
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
14 MeV photon spectrum

Gamma Energy (MeV)

Gamma Prod (barns/MeV)
Particle heating contributions

- Protons
- Deuterons
- Tritons
- Alphas
Recoil Heating

Energy (MeV) vs Heating (MeV/reaction) graph showing a curve that increases with energy, indicating a relationship between energy and heating.
Particle production cross sections

Energy (MeV) vs. Cross section (barns)

- Protons
- Deuterons
- Tritons
- Alphas
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
protons from (n,x)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+ protons from (n,n*)p
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
protons from (n,npa)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
protons from (n,2p)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
protons from (n,pa)
angular distribution for (n,p*0) proton
angular distribution for (n,p*1) proton
angular distribution for (n,p*2) proton
angular distribution for (n,p*3) proton
Angular distribution for \((n,p^*_4)\) proton.
angular distribution for (n,p*5) proton
angular distribution for \((n,p^*6)\) proton
angular distribution for (n,p*7) proton
angular distribution for (n,p*)8 proton
angular distribution for (n,p*9) proton
angular distribution for (n,p*10) proton
angular distribution for \((n,p^{*11})\) proton

Energy (MeV)

Cosine

Prob/Cos
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
angular distribution for (n,p*12) proton
angular distribution for (n,p*13) proton
angular distribution for (n,p*14) proton
angular distribution for (n,p*15) proton
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+

angular distribution for (n,p*16) proton
angular distribution for (n,p*17) proton
angular distribution for (n,p*18) proton
angular distribution for (n,p*19) proton
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
protons from (n,p*^c)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
deuterons from (n,x)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
deuterons from \((n,n^*)d\)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
deuteron from (n,da)
angular distribution for \((n,d^0)\) deuteron
angular distribution for \((n,d^*1)\) deuteron
angular distribution for \((n,d^*2)\) deuteron
angular distribution for (n,d*3) deuteron
angular distribution for (n,d*4) deuteron
angular distribution for $(n,d^*5)$ deuteron
angular distribution for \((n,d^*6)\) deuteron
angular distribution for (n,d*7) deuteron
angular distribution for \((n,d^8)\) deuteron
angular distribution for \((n,d^*9)\) deuteron
angular distribution for (n,d*10) deuteron
angular distribution for (n,d*11) deuteron

Energy (MeV) on the x-axis, Cos|Cos| on the y-axis, and Prob|Cos| on the z-axis.
angular distribution for (n,d*12) deuteron
angular distribution for (n,d*13) deuteron
angular distribution for (n,d*14) deuteron
angular distribution for \((n,d^*15)\) deuteron
angular distribution for (n,d*16) deuteron
angular distribution for \((n,d^\dagger17)\) deuteron
angular distribution for (n,d*18) deuteron
Angular distribution for (n,d*) deuteron

13-Al-27 for FENDL-3.2 from JEFF-3.1 by NJOY2016.60+
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
deuterons from \((n,d^*c)\)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
tritons from (n,x)
angular distribution for (n,t*0) triton
angular distribution for (n,t*1) triton
angular distribution for \((n,t^*2)\) triton
angular distribution for (n,t*3) triton
angular distribution for (n,t*4) triton
angular distribution for (n,t*5) triton
angular distribution for (n,t*6) triton
angular distribution for (n,t*7) triton
angular distribution for (n,t*8) triton
angular distribution for \( (n,t*9) \) triton
angular distribution for (n,t*10) triton
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
tritons from (n,t\*c)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
alphas from (n,x)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
alphas from (n,n*)a
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
alphas from (n,npa)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
alphas from (n,2a)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
alphas from (n,pa)
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
alphas from (n,da)
angular distribution for (n,a*0) alpha
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
angular distribution for \( (n,a^*1) \) alpha
angular distribution for (n,a^2) alpha
angular distribution for (n,a*3) alpha
angular distribution for (n,a*4) alpha
angular distribution for (n,a^5) alpha
angular distribution for (n,a*6) alpha
angular distribution for (n,a*7) alpha
angular distribution for (n,a*8) alpha
angular distribution for (n,a*) alpha
angular distribution for \((n, a^{*10})\) alpha
angular distribution for (n,a*11) alpha
angular distribution for (n,a*12) alpha
angular distribution for (n,a*13) alpha
angular distribution for \((n,a^*14)\) alpha
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
angular distribution for (n,a*15) alpha

![Graph showing angular distribution](image-url)
angular distribution for (n,a*16) alpha
angular distribution for (n,a*17) alpha
angular distribution for (n,a*18) alpha
angular distribution for (n,a*19) alpha
13-AL-27 FOR FENDL-3.2 FROM JEFF-3.1.1 BY NJOY2016.60+
alphas from (n,a^c)