Physics performances of baseline target design (Solution #5)

n_TOF Target#3 Review
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and the nTOF Target#3 WG
Baseline Solution #5

Top cross section

Side cross section

Front cross section

\( p^+ \)

\( \text{EAR1} \)

\( \text{EAR2} \)
Baseline Solution #5

Target:

Pb 5×5cm + 1×15cm
Al support structures
Enclosed in SS container

EAR1:
4cm B-H₂O moderator

EAR2:
5cm Pb + 3.5cm H₂O moderator
Neutron Fluence: EAR1

Sol #5 current: current base line design
Sol #5 previous: as presented in past nTOF collaboration meeting (for ref)
Solution #4: previous proposed solution
Solution #0: currently installed target
Neutron Fluence: EAR1

- ↓-15%
- ↑+20%
Neutron Fluence: EAR2

≈same

↑<×2
Prompt Photon Fluence: EAR1

≈same
Prompt Photon Fluence: EAR2

≈same
Delayed Photon Fluence: EAR1

Energy (eV)

Delayed Photon Fluence (d(\text{d}n/\text{d}E)/10^{12} \text{P}_{\text{c}})

$\downarrow/4-5$

2.2MeV

7-8 MeV
Delayed Photon Fluence: EAR2

\[ \approx \text{same (with H}_2\text{O moderator)} \]

2.2\text{MeV} \downarrow/2-3 \text{7-8 MeV}

\text{Everywhere else} \downarrow \times 2
Resolution Function: EAR1

1 to 10 eV

1 to 10 keV

1 to 10 MeV
Resolution Function: EAR2

1 to 10 eV

1 to 10 keV

1 to 10 MeV
Conclusions

The proposed target #3 design **fulfills all the requirements** of nTOF collaboration

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Target performance</th>
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<tbody>
<tr>
<td><strong>EAR1</strong></td>
<td></td>
</tr>
<tr>
<td>neutron fluence</td>
<td>no reduction more than 10-15%</td>
</tr>
<tr>
<td>prompt photons</td>
<td>better or similar</td>
</tr>
<tr>
<td>delayed photons</td>
<td>improve gamma background</td>
</tr>
<tr>
<td>resolution</td>
<td>-</td>
</tr>
<tr>
<td>background</td>
<td>-</td>
</tr>
<tr>
<td><strong>EAR2</strong></td>
<td></td>
</tr>
<tr>
<td>neutron fluence</td>
<td>not higher than ×2 (×3 tolerated)</td>
</tr>
<tr>
<td>prompt photons</td>
<td>-</td>
</tr>
<tr>
<td>delayed photons</td>
<td>-</td>
</tr>
<tr>
<td>resolution</td>
<td>improve</td>
</tr>
<tr>
<td>background</td>
<td>-</td>
</tr>
</tbody>
</table>
Thank you!