Gas targets for hypernuclear experiments

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京都大学
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Target meeting

- 11:00—12:30 on Jan 14, 2021
- Participants: David Meekins and Toshiyuki Gogami

Two options for target

Δ t: Uniformity of cell

1. Fill and seal the cell at room temperature (300K)

   → Cool down for operation (40K)

   - Wall thickness = 1.25 mm (Δ t = 0.025 mm; Δ t/t = 2%)

2. Fill the cell with gas at low temperature (40K)

   → Operation

   - Wall thickness = 0.25 mm (Δ t = 0.025 mm; Δ t/t = 10%)

Option	Resolution FWHM (MeV)	$\left\|B_{\Lambda}^{\mathbf{stat.}}\right\|$	$\left\|B_{\Lambda}^{dp:sys.}\right\|$	$\left\|B_{\Lambda}^{\mathbf{tot.}}\right\|$	Regards
1	1.2	24	40	**70**	Much easier to make and operate
2	1.1	22	27	**60**	4—6 months to design + fabricate

Two options for target

cell

1. Fill and seal the cell at room te
   → Cool down for operati
   - Wall thickness

2.
   →
   - W (Δ t = 0.025 mm; Δ t/t = 10%)

(40K)

The option 1 meets our requirement although the option 2 is a little better.
→ We could go with the option 1 that could save a lot of time and resources.

Option	FWHM (MeV)	$\lvert B_\Lambda^{\mathrm{stat.}} \rvert$	$\lvert B_\Lambda^{dp:sys.} \rvert$	$\lvert B_\Lambda^{\mathrm{tot.}} \rvert$	Regards
1	1.2	24	40	**70**	Much easier to make and operate
2	1.1	22	27	**60**	4—6 months to design + fabricate

cell height

I will check it.

Solid targets

- Li, B, C, ^{40,48}Ca, ^{208}Pb
- CH_2
- (^{3,4}He, H, Empty, Multi-C foils)

Gas densities

Rough estimation

- H: 2.7 mg/cm^3
- ^{3}He: 4.1 mg/cm^3
- ^{4}He: 5.4 mg/cm^3

Density reduction with beam

- The density could be reduced by 20—30%.
- For the yield estimation, 50% loss could be a good assumption for the next PAC (I used a value of 15% for the density reduction in the last proposal).