

LAMPS 실험을 위하여 우리가 해야할 숙제들

중 생각나는 일부와 TOF 검출기 개발 진행 상황

안 정 근
(고려대학교)



LAMPS Physics @ RAON

1. $^x\text{Ca} + ^y\text{Ca}$ to measure n/p ratio and collective flow
2. Ar + KCl or Xe + CsI
3. $^x\text{Ni} + ^y\text{Ni}$ and $^x\text{Sn} + ^y\text{Sn}$: the directed flows and π^- / π^+ ratio
4. $^{10}\text{Be} + ^4\text{He}$ and $^8\text{He} + ^4\text{He}$

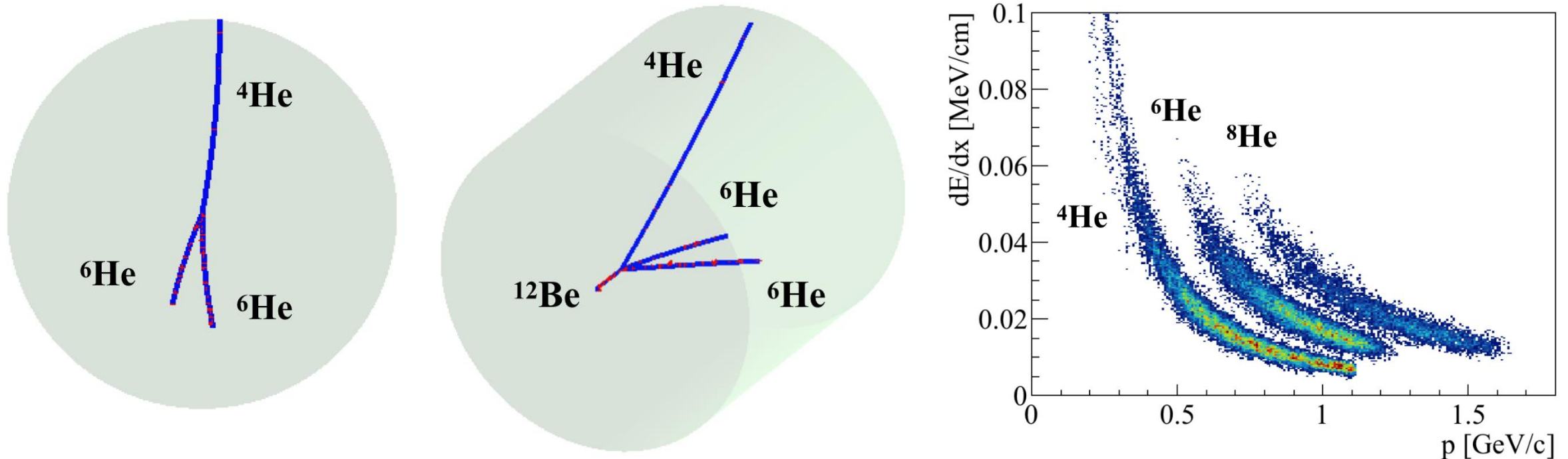


- 활용 백서 작성하며 짧게 설명을 적었지만 각 대표 반응의 시뮬레이션 연구는 없는 듯...

LAMPS Physics @ RAON

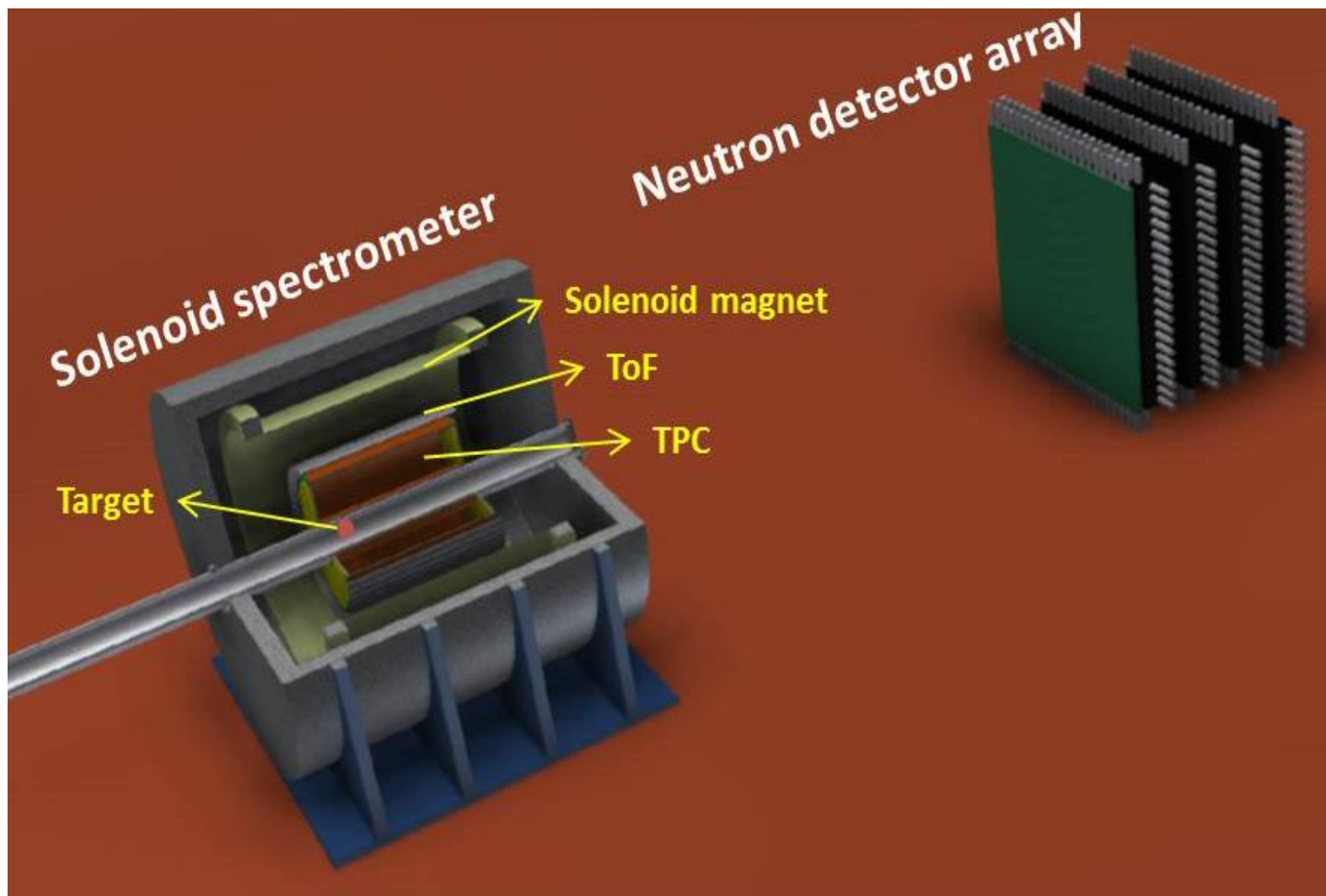


- $^x\text{Ca} + ^y\text{Ca}$ to measure n/p ratio and collective flow
- $\text{Ar} + \text{KCl}$ or $\text{Xe} + \text{CsI}$ ($^{16}\text{O} + \text{X}$)
- $^x\text{Ni} + ^y\text{Ni}$ and $^x\text{Sn} + ^y\text{Sn}$: the directed flows and π^- / π^+ ratio
- $^{10}\text{Be} + ^4\text{He}$, $^8\text{He} + ^4\text{He}$ and $^{12}\text{Be} + ^4\text{He}$
- **Internal Pair Production : $^8\text{Be}^* (1^+) \rightarrow ^8\text{Be} (0^+) + e^+e^-$**



- 빔 에너지가 200 AMeV인 LAMPS에선 ${}^6\text{He}$ 쌍이 더 Forward로 간다.
- Active target이 아니라 그냥 ${}^4\text{He}$ gas target에 ToF 측정으로 PID와 E측정
- **Si Detector로 Forward Tracker가 있다면 행복할 듯!**

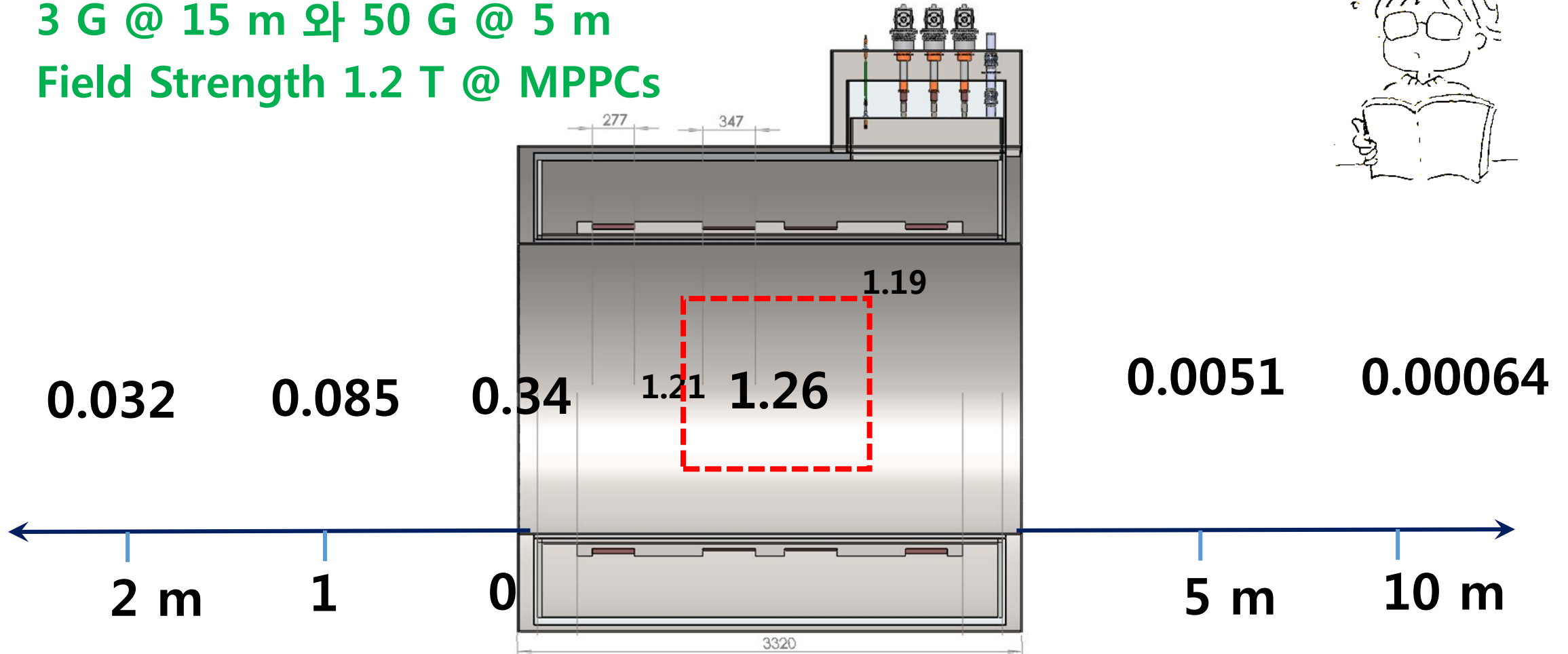
LAMPS Hall @ RAON



- **Inventor3D**
도면 수정 필요
- **LAMPS 실험 Hall (Hutch) Floor**
도면도 필요

LAMPS @ RAON

- Fringe Field의 세기 500 G @ Start Counter
- 3 G @ 15 m 와 50 G @ 5 m
- Field Strength 1.2 T @ MPPCs



LAMPS @ RAON

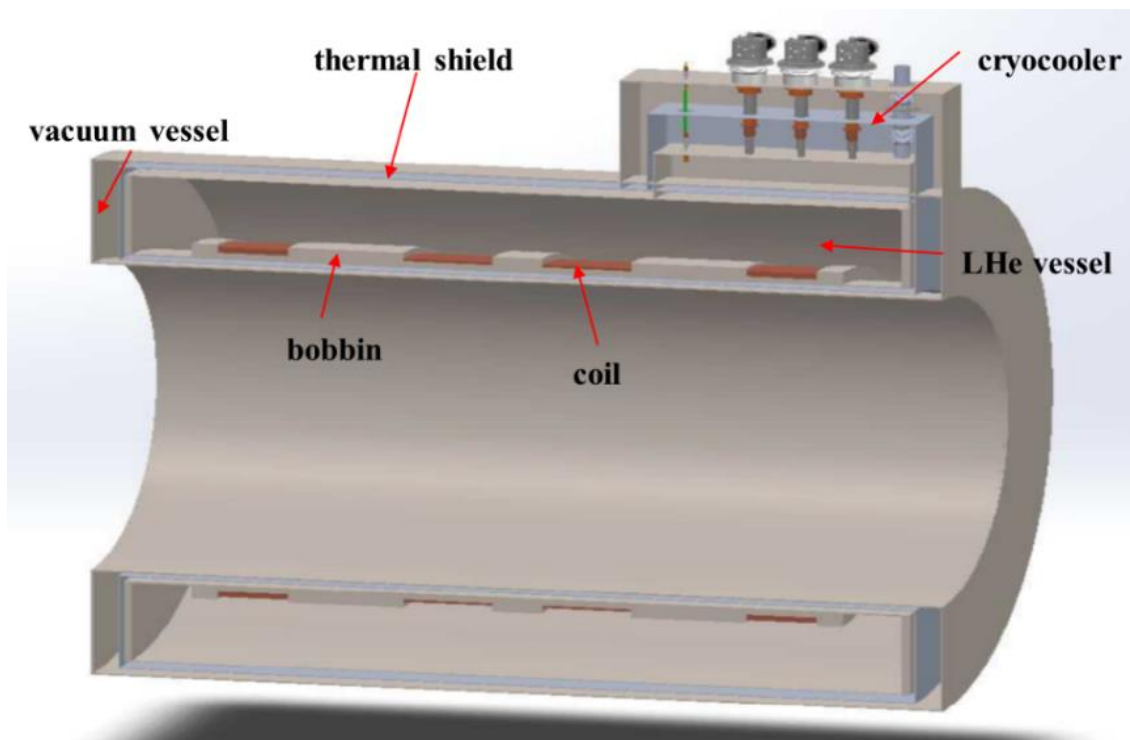
- 초전도 전자석은? 냉각 42일 또는 8일 using two 1-W cryocoolers. 냉각효율이 괜찮을까?
- Solenoid Field가 Beam Trajectory에 미치는 영향은? LHC 경우 Compensator Magnet이 있음.



LAMPS @ RAON

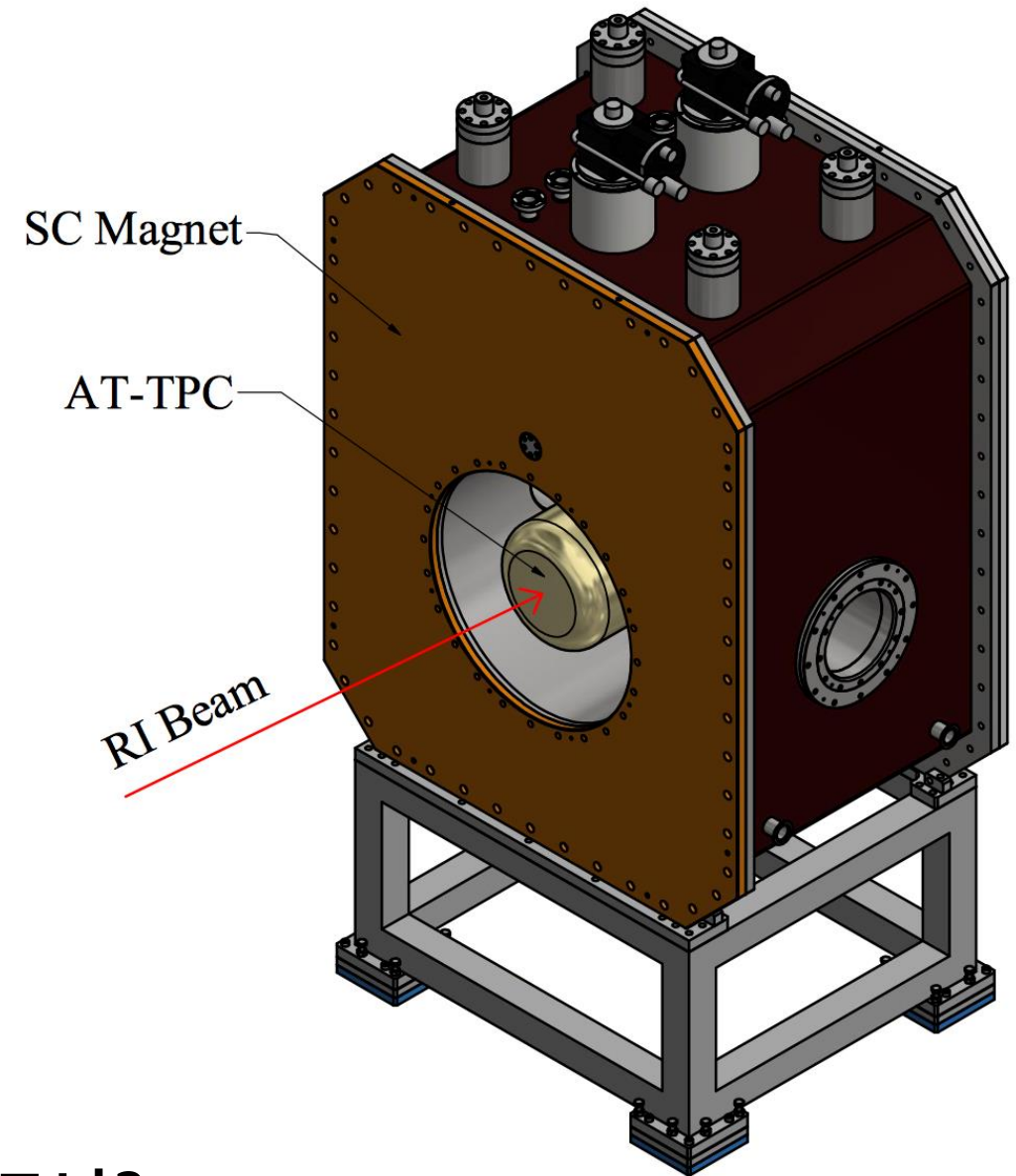
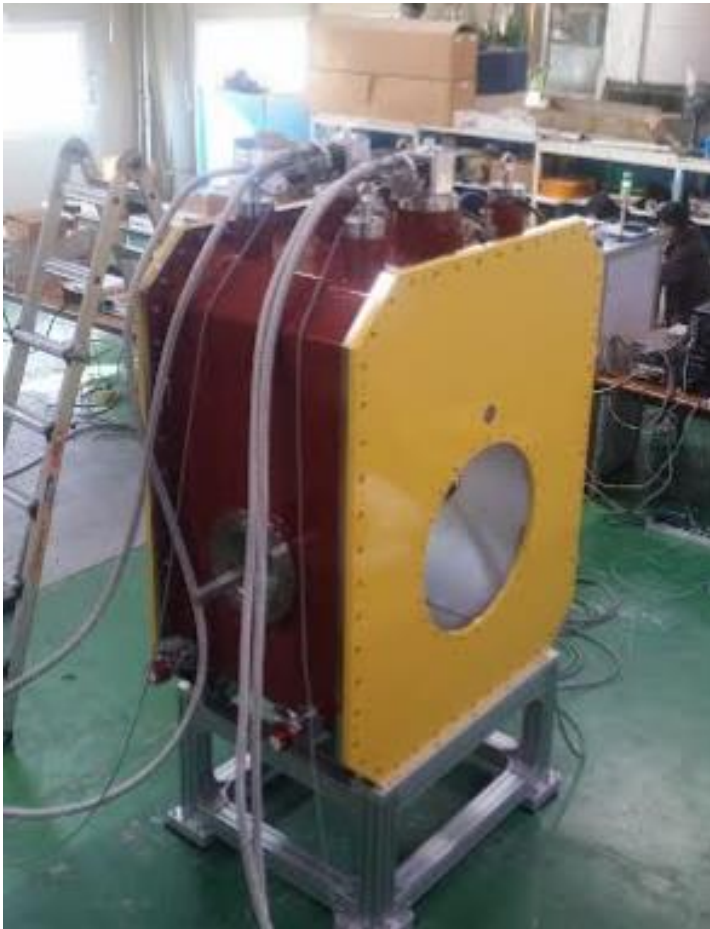


MAGNET DIVISION



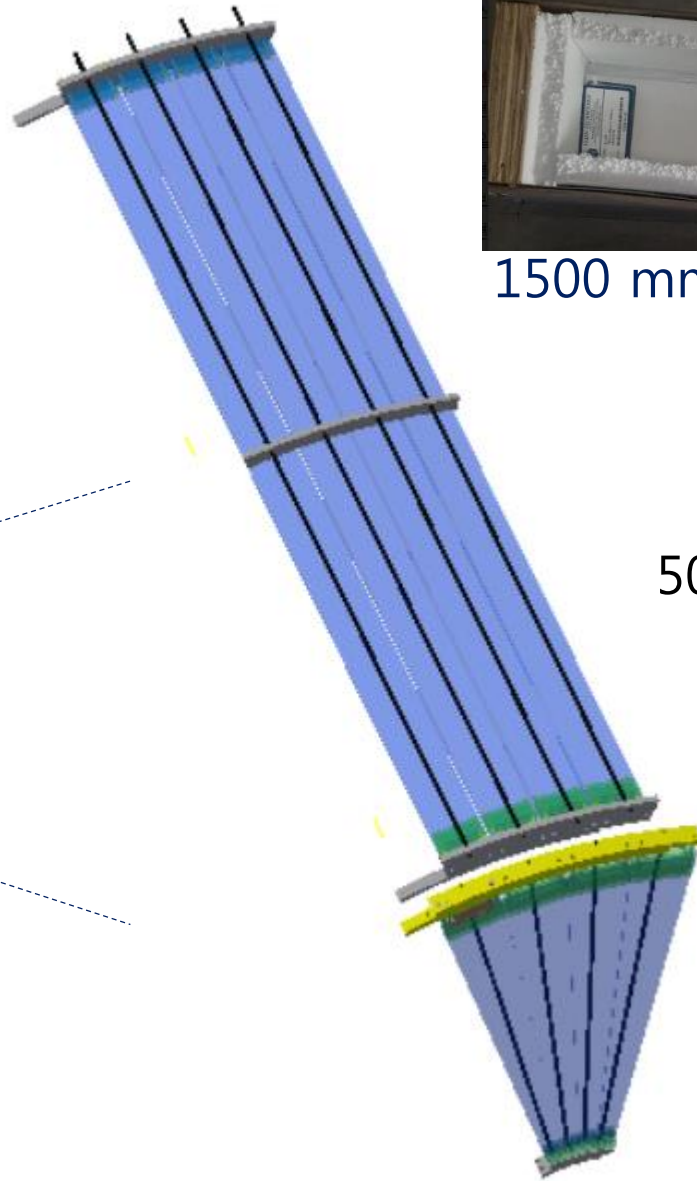
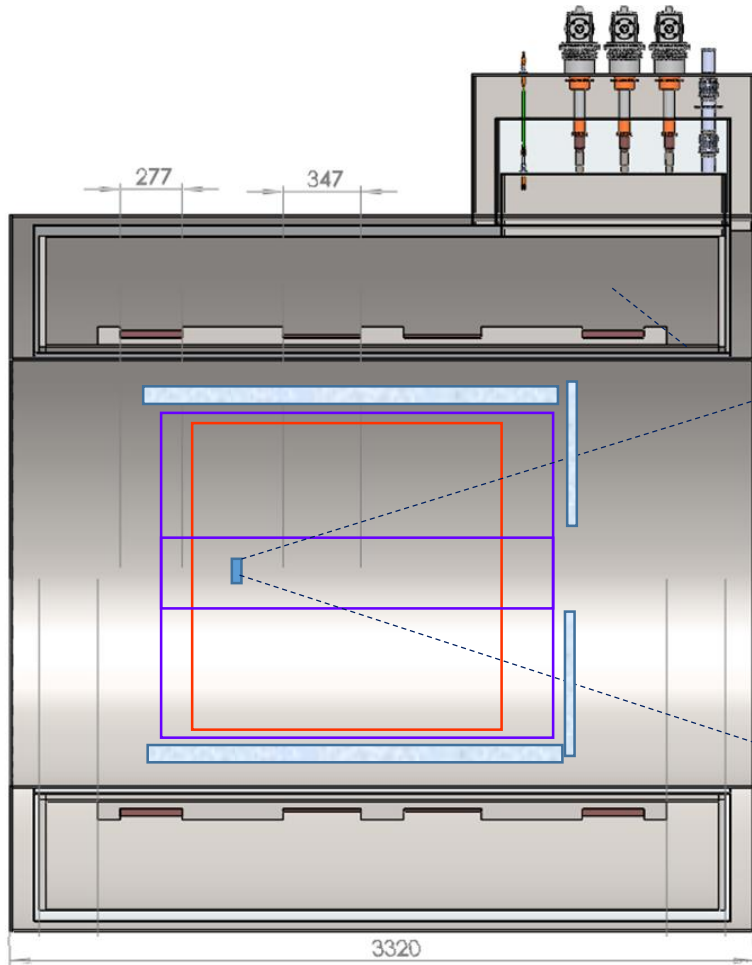
- 백서에 넣은 왼쪽 그림은 틀린 그림! 솔레노이드 자석은 Conduction-cooled superconducting magnet!

LAMPS @ RAON



- LAMPS TPC 안에 또다른 mini-TPC?
- 2020년에 Low-Pressure He-gas TPC를 만드나?

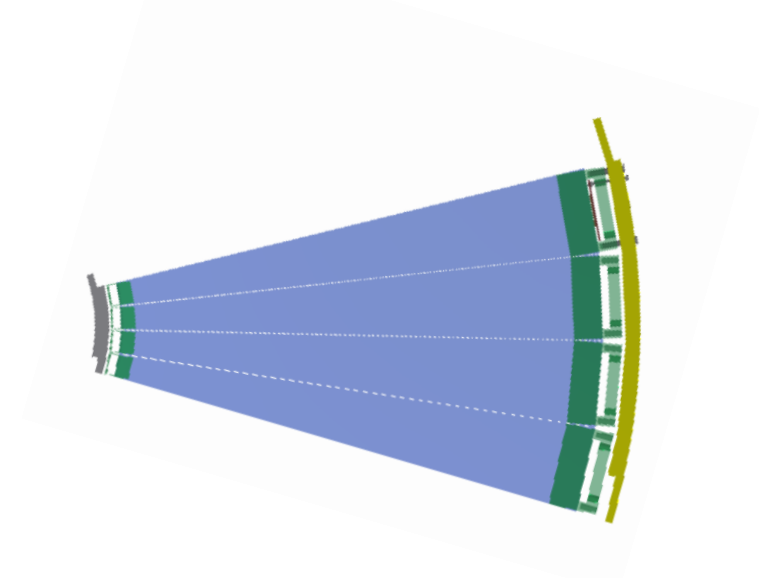
Time-of-Flight Counter



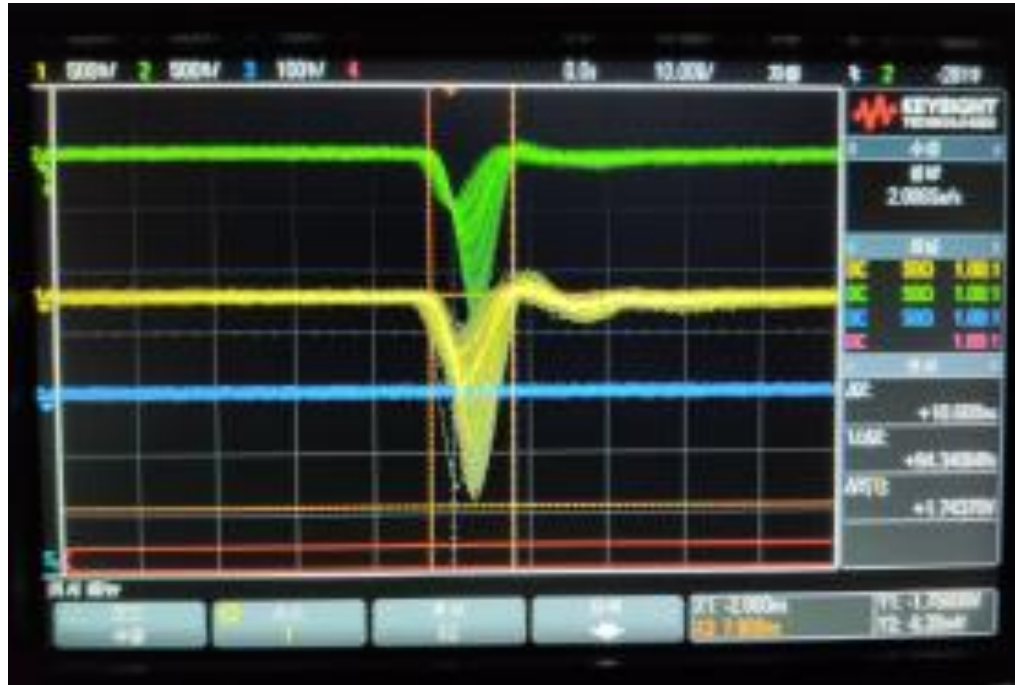
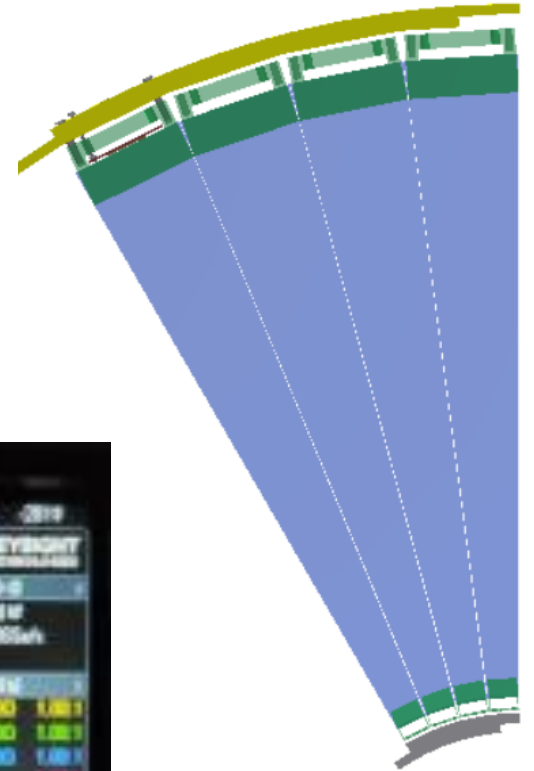
1500 mm x 90 mm x 10 mm (48)



500 mm x (90, 25) mm x 5 mm (48)



Time-of-Flight Counter



MPPC Amplifier Boards

LAMPS 2019

- MPPC amp circuit (test version) : 약 600 만원
- MPPCs : 약 800 만원
- Short Scintillators : 약 400 만원
- Long Scintillators : 약 800 만원
- TDC, QDC : 약 900 만원



추가

- MPPC amp circuit (revised version) : 약 550 만원
- Trigger 검출기 support structure : 보람 테크 (??? 만원)

Neutron Detector Array



LAMPS 2020 @ RAON

- **Up-going Muon Detection**
- **Cosmic-ray neutron flux (primary or secondary neutron?)**

- **Active Target TPC (Real-size mock-up, 1024 channels, 3x3 mm²)**
- **Forward Tracker (Si? Drift Chamber?)**
- **Forward Time-of-Flight (Multi-gap RPC?)**