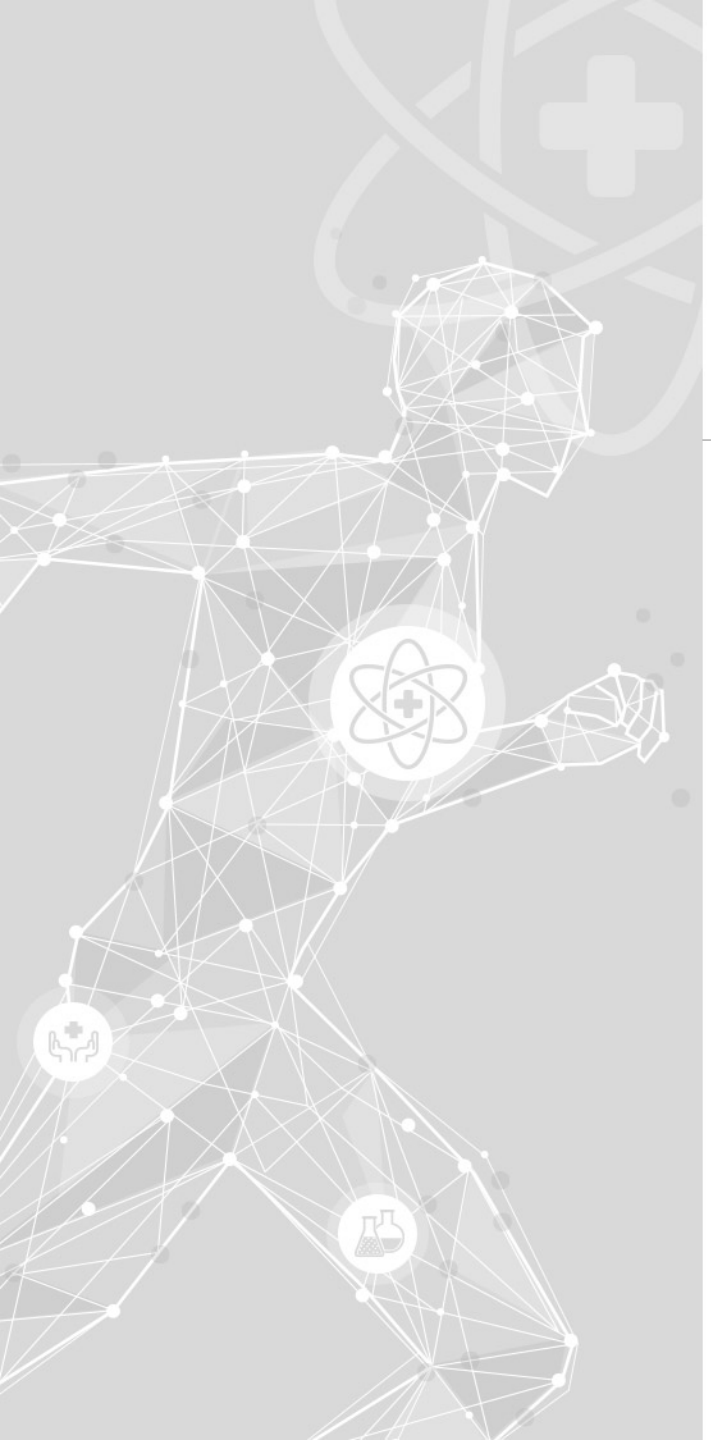
한국원자력의학원
KOREA INSTITUTE OF RADIOLOGICAL & MEDICAL SCIENCES

The first beam of 500 keV high current proton tandem accelerator in KIRAMS

- 2022년도 제4차 소형 중성자원 개발과 이용 워크숍

홍 봉 환
한국원자력의학원 의료용가속기 연구팀 / RI 응용부

2022.10.19



한국원자력의학원
KOREA INSTITUTE OF RADIOLOGICAL & MEDICAL SCIENCES

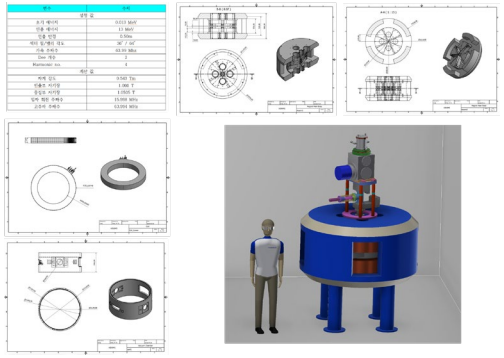
CONTENTS

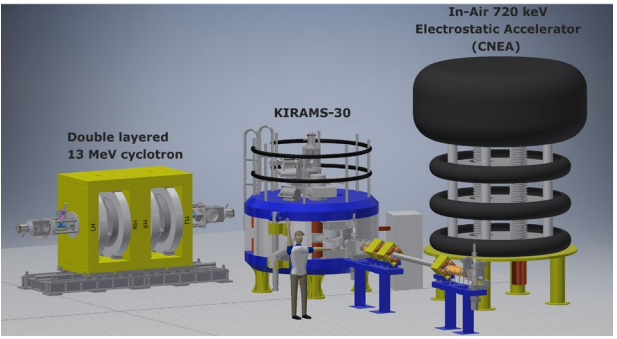
KOREA INSTITUTE OF RADIOLOGICAL & MEDICAL SCIENCES

Developing a high-power accelerator for BNCT

KIRAMS-cyclotron model development

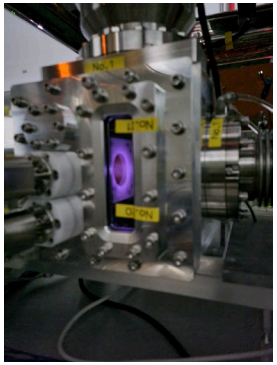
2017 ~ 2019





In-Air Single-ended Electrostatic Accelerator
Technology transfer from CNEA/Argentina

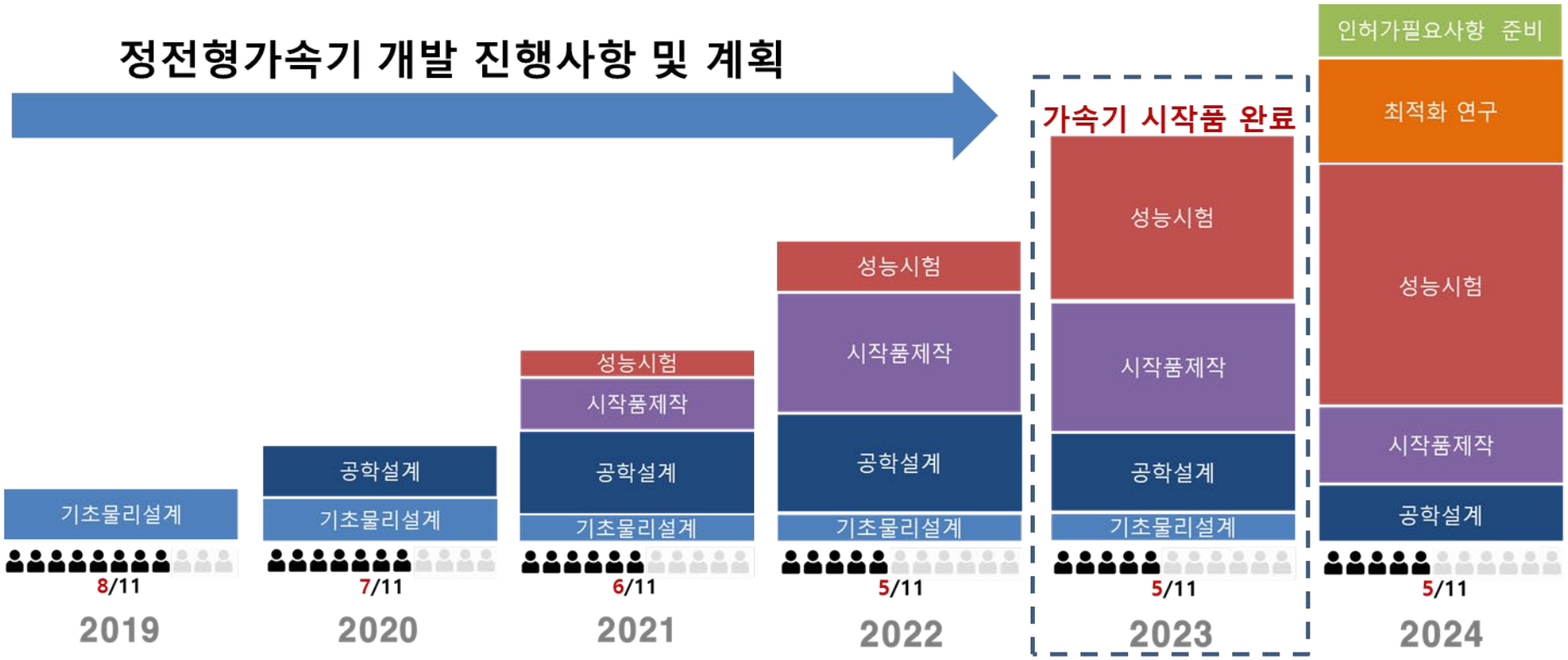
2019 ~ 2022



KIRAMS-Tandem model development

2020 ~ 2023

Milestone


정전형가속기 개발 진행사항 및 계획
기초물리설계
8/11
2019
공학설계
기초물리설계
7/11
2020
성능시험
시작품제작
공학설계
기초물리설계
6/11
2021
성능시험
시작품제작
공학설계
기초물리설계
5/11
2022
가속기 시작품 완료
성능시험
시작품제작
공학설계
기초물리설계
5/11
2023
인허가필요사항 준비
최적화 연구
성능시험
시작품제작
공학설계
5/11
2024

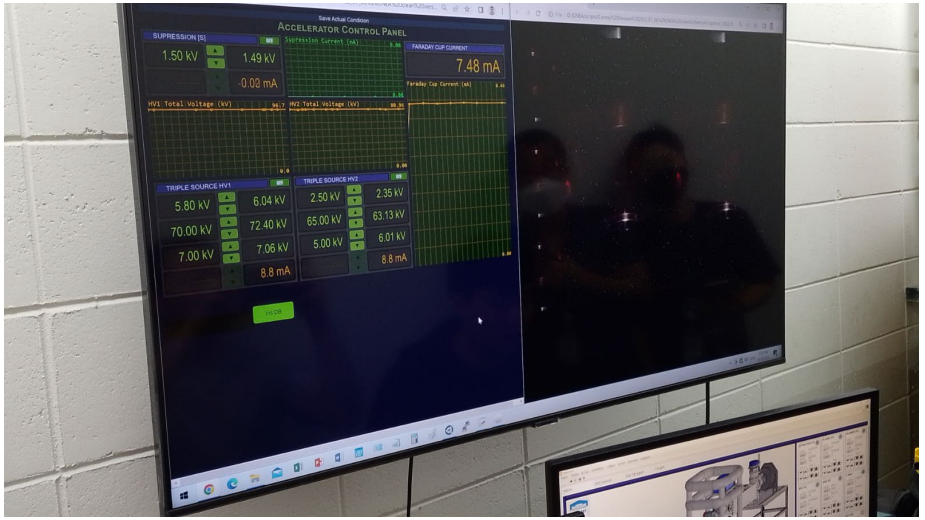
Progress with CNEA

240 keV single-ended electrostatic accelerator

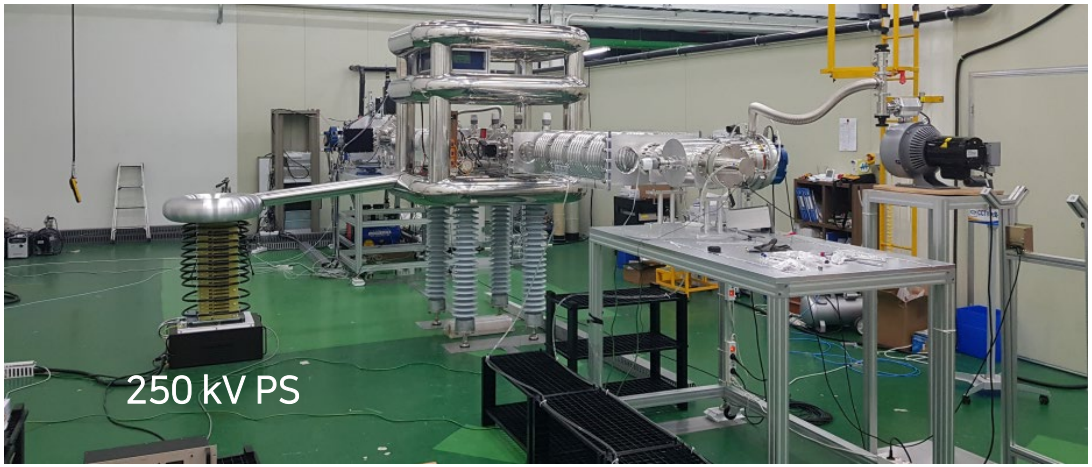
240 kV - 15 mA Single-ended 가속기 구축

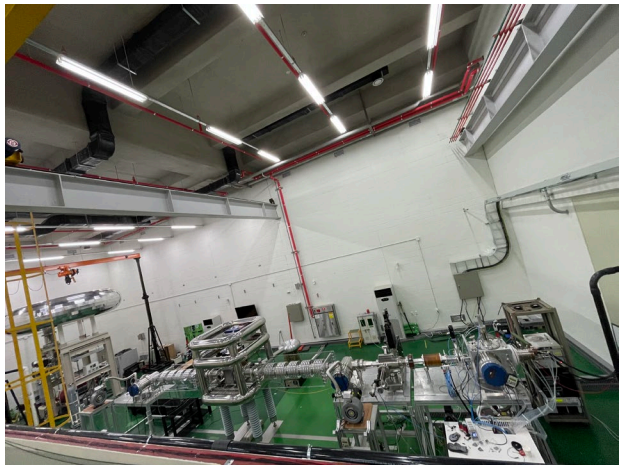
Semi-final

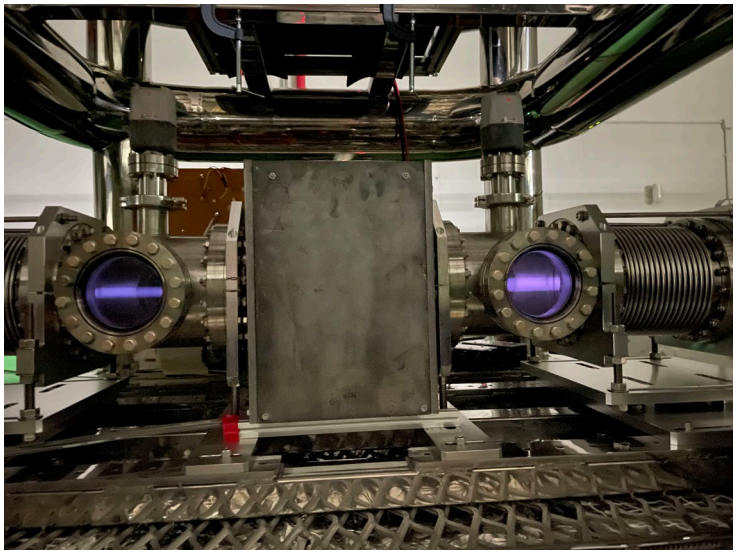
154.5 keV, 7.48 mA



July 2022

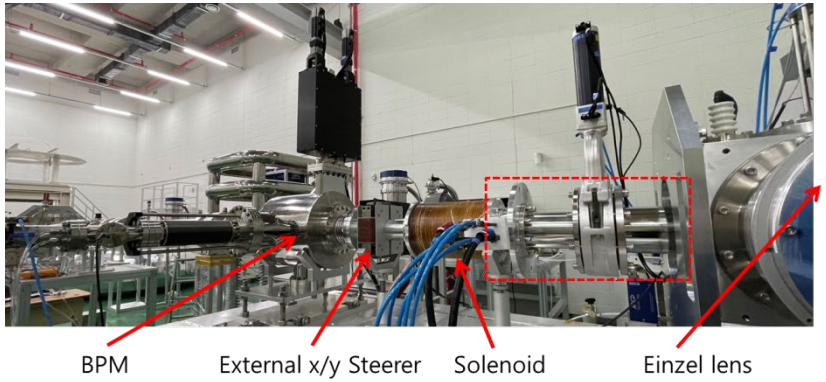




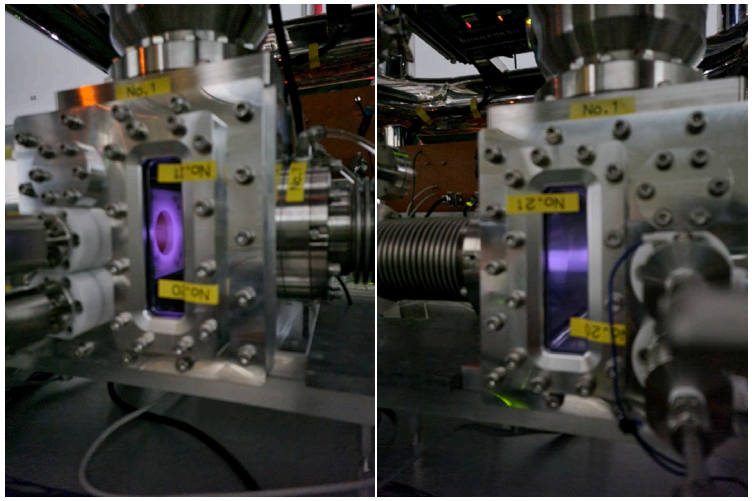


양성자 500 keV / 2 mA 인출

인출 효율 : 20% 인젝터, 스트리퍼 최적화 필요

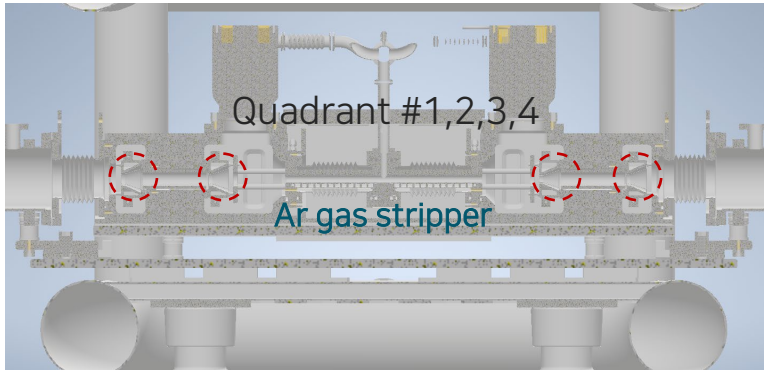


October 2022



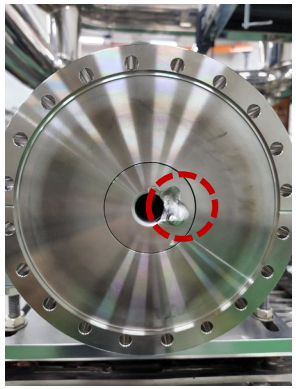
양성자 500 keV / 5.5 mA 인출

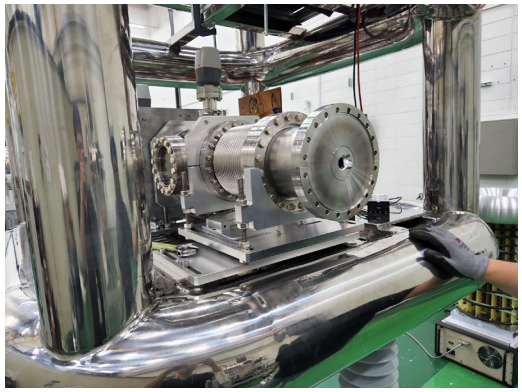
인출 효율 : 65% **빔 튜닝 쿼드런트 추가**

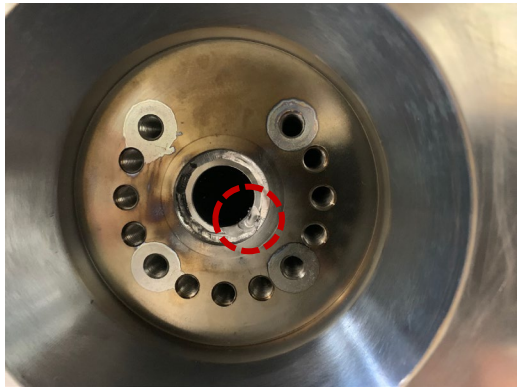


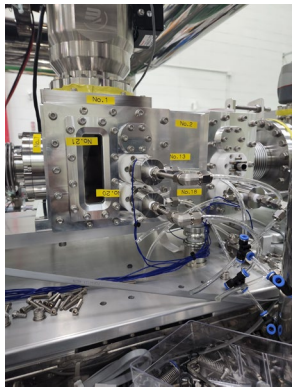
ISSUES

Beam focusing and steering



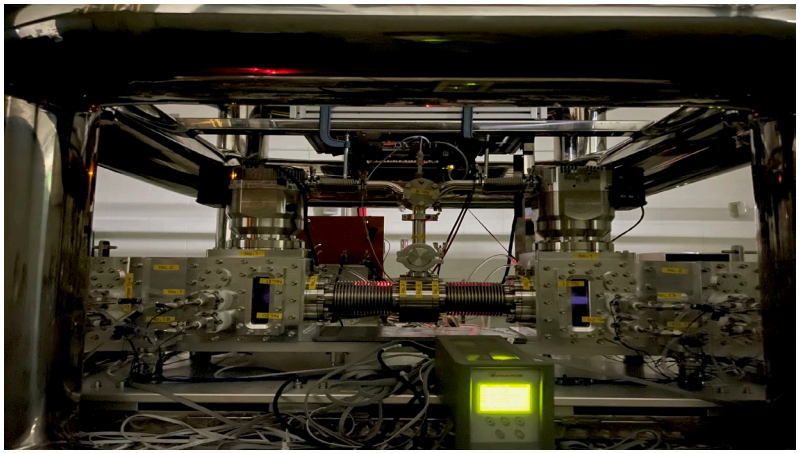


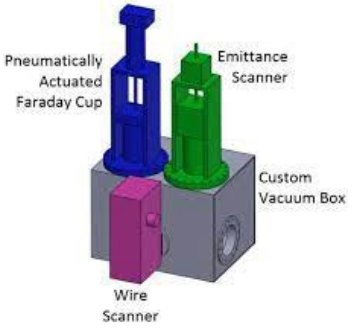




Magnet or Electrostatic?

Beam monitoring



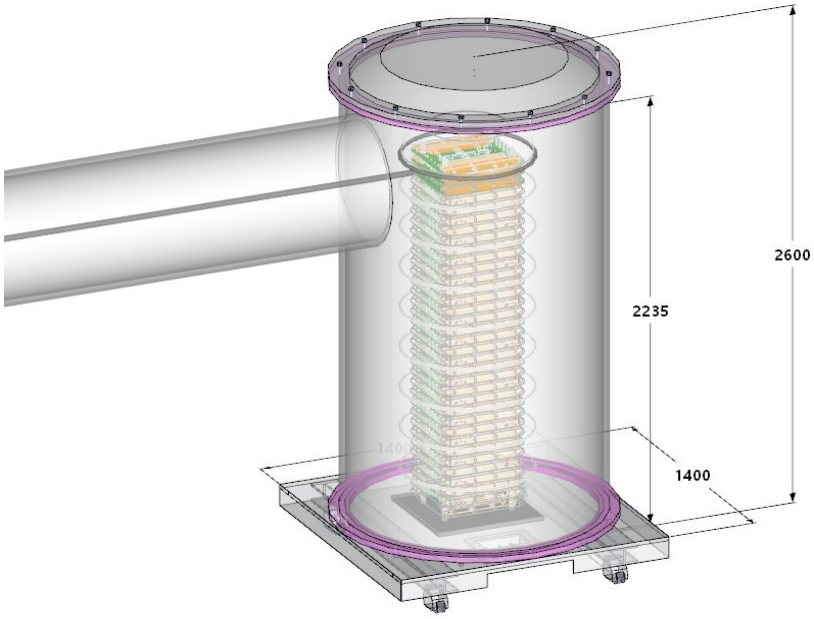


How many, where?

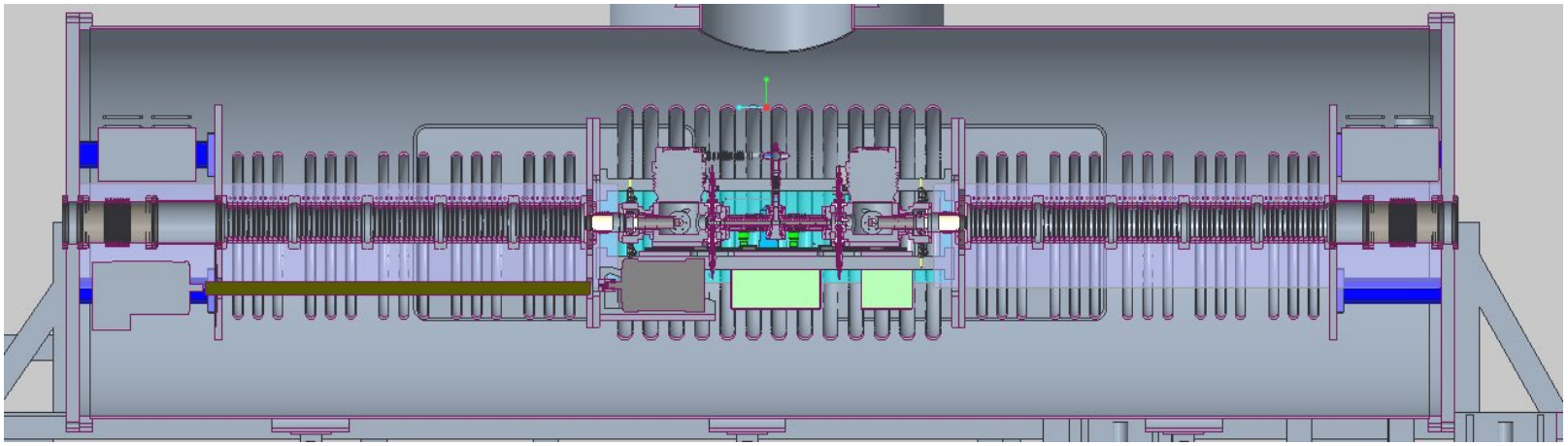
750 kV Cockcroft Walton dc power supply

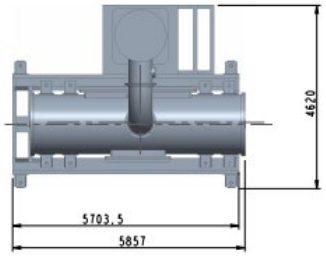
550 kV in-air test was successful

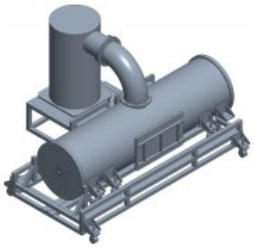
Prototype for final design 1.2 MV

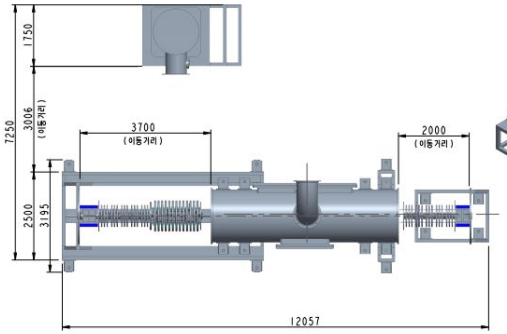


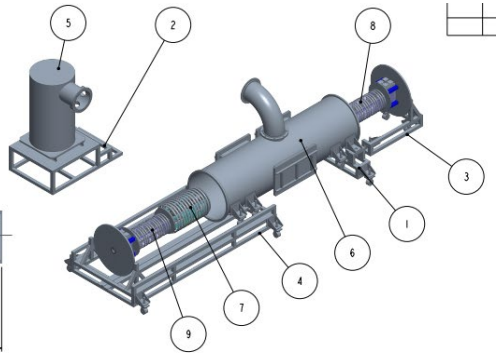
2.4 MeV proton tandem accelerator with SF_6 chamber

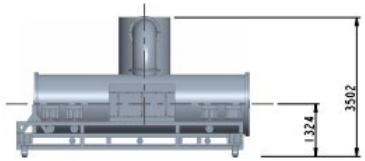


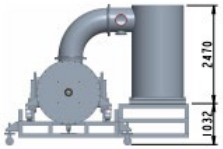


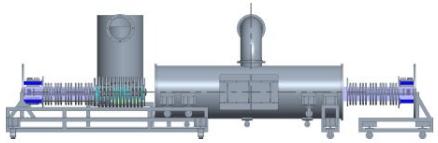


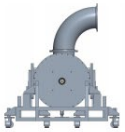




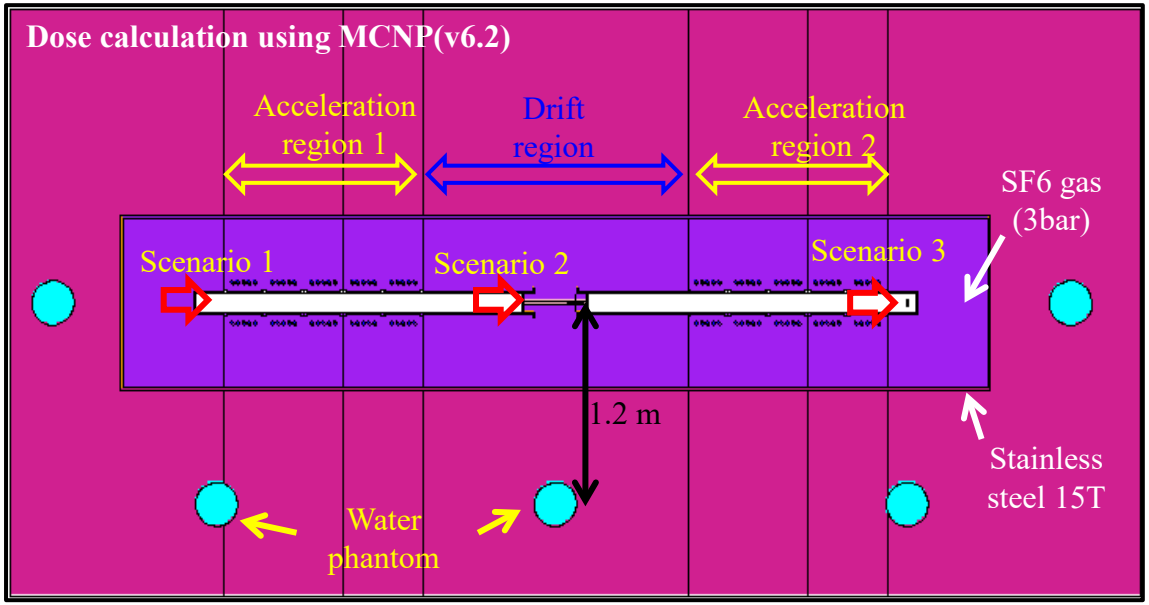


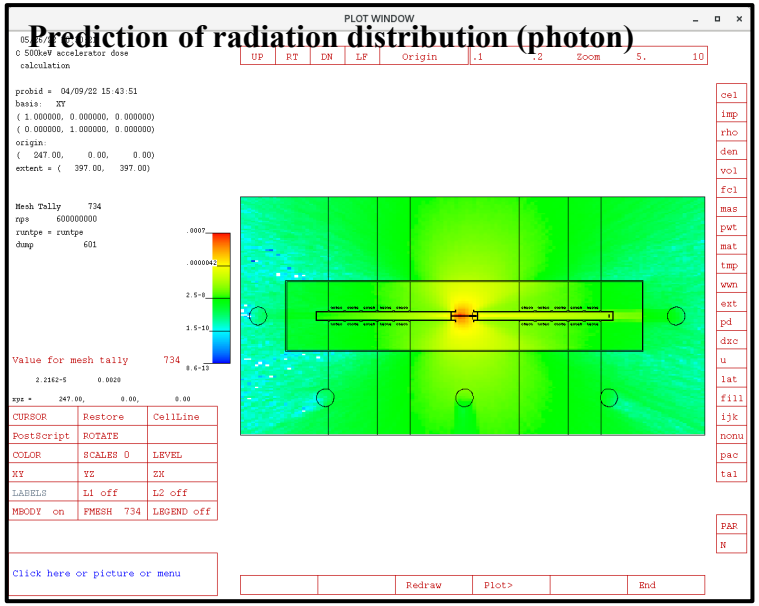






2.4 MeV Radiation Shielding Issue

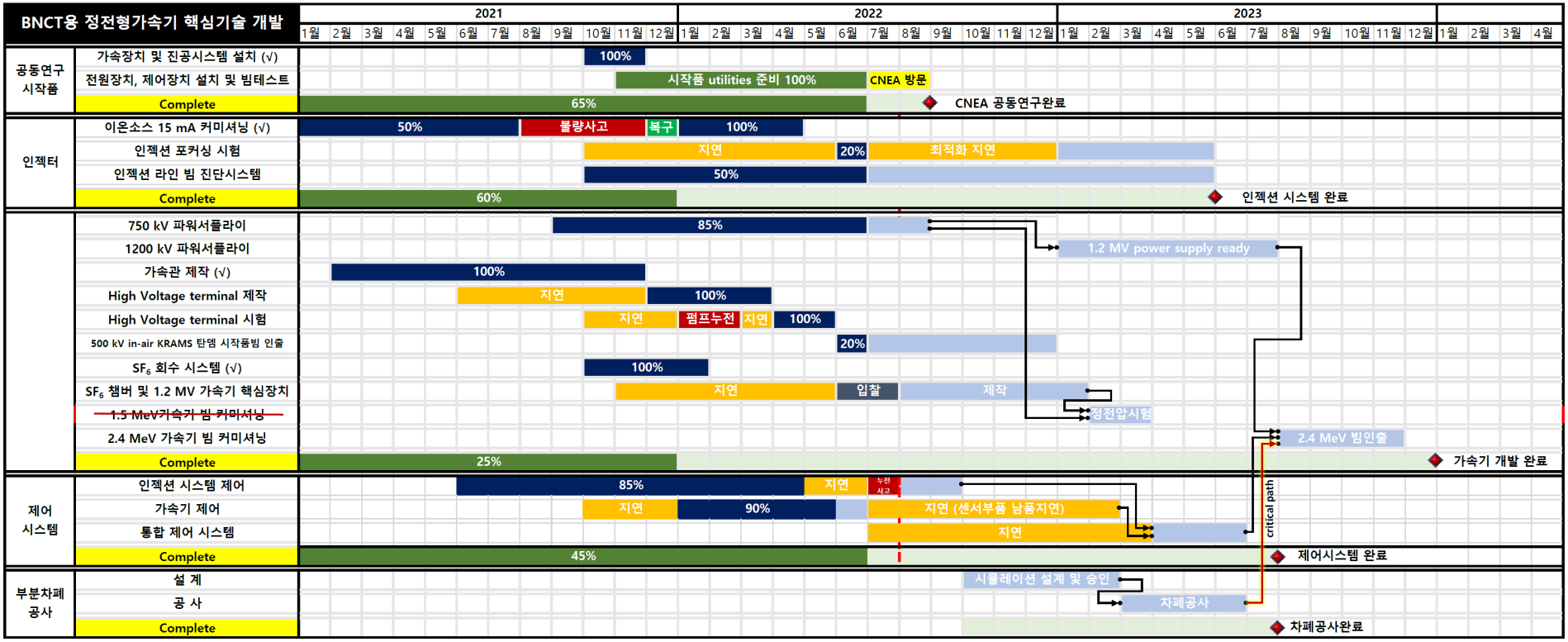




	Cell 701	Cell 702	Cell 703	Cell 704	Cell 705
Scenario2	44.29	1366.81	226.91	27.31	148.18
Scenario3	0	0	0.46	0	1.81
Total (Sv/week)	44.29	1366.81	227.37	27.31	149.99

(at least) 15 cm lead shielding material needed

한국원자력의학원
KOREA INSTITUTE OF RADIOLOGICAL & MEDICAL SCIENCES



감사합니다

한국원자력의학원
KOREA INSTITUTE OF RADIOLOGICAL & MEDICAL SCIENCES