



ECHIR: a Beamline for Chip Irradiation at ESS

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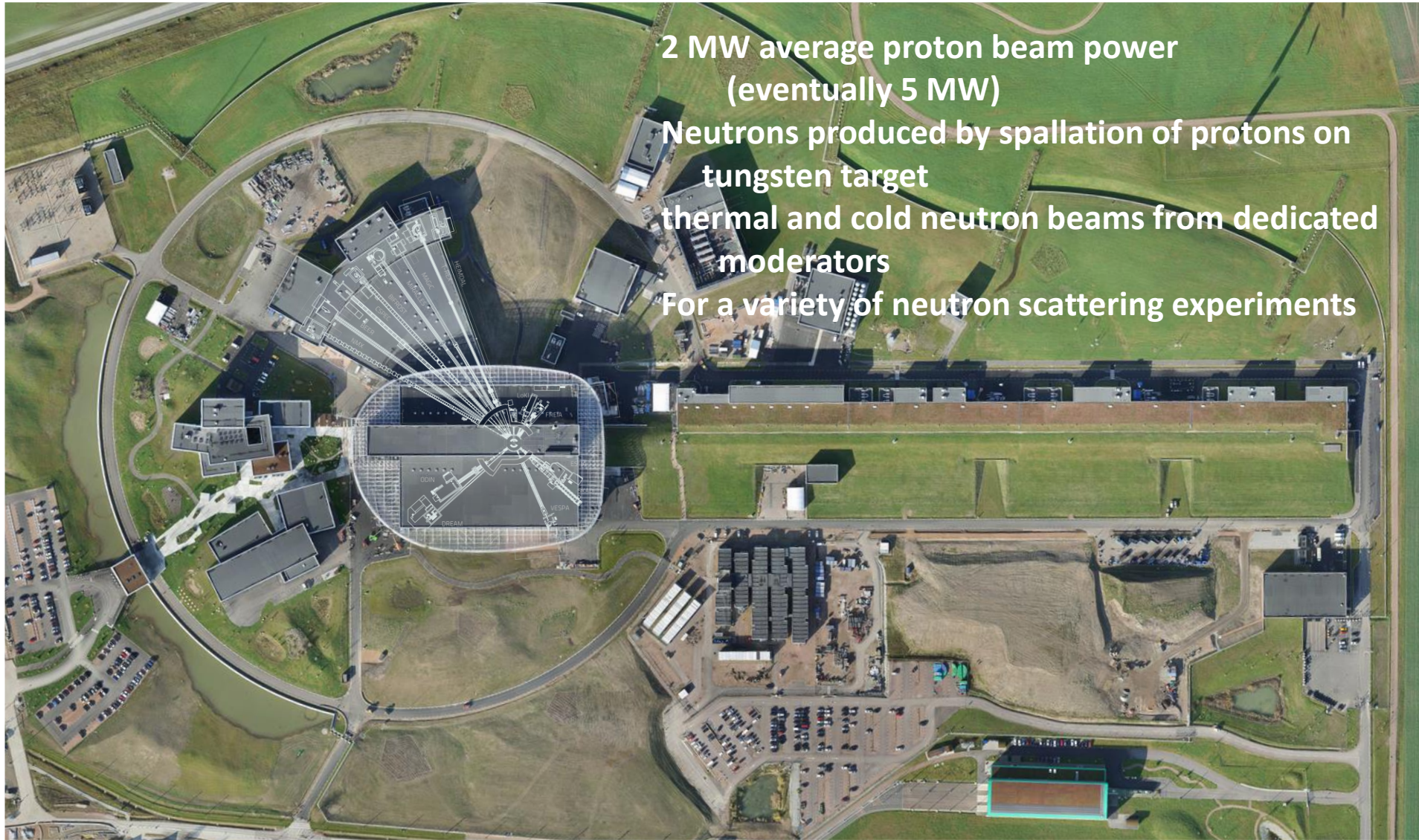
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ESS European Spallation Source in Lund, Sweden



ESS European Spallation Source in Lund, Sweden

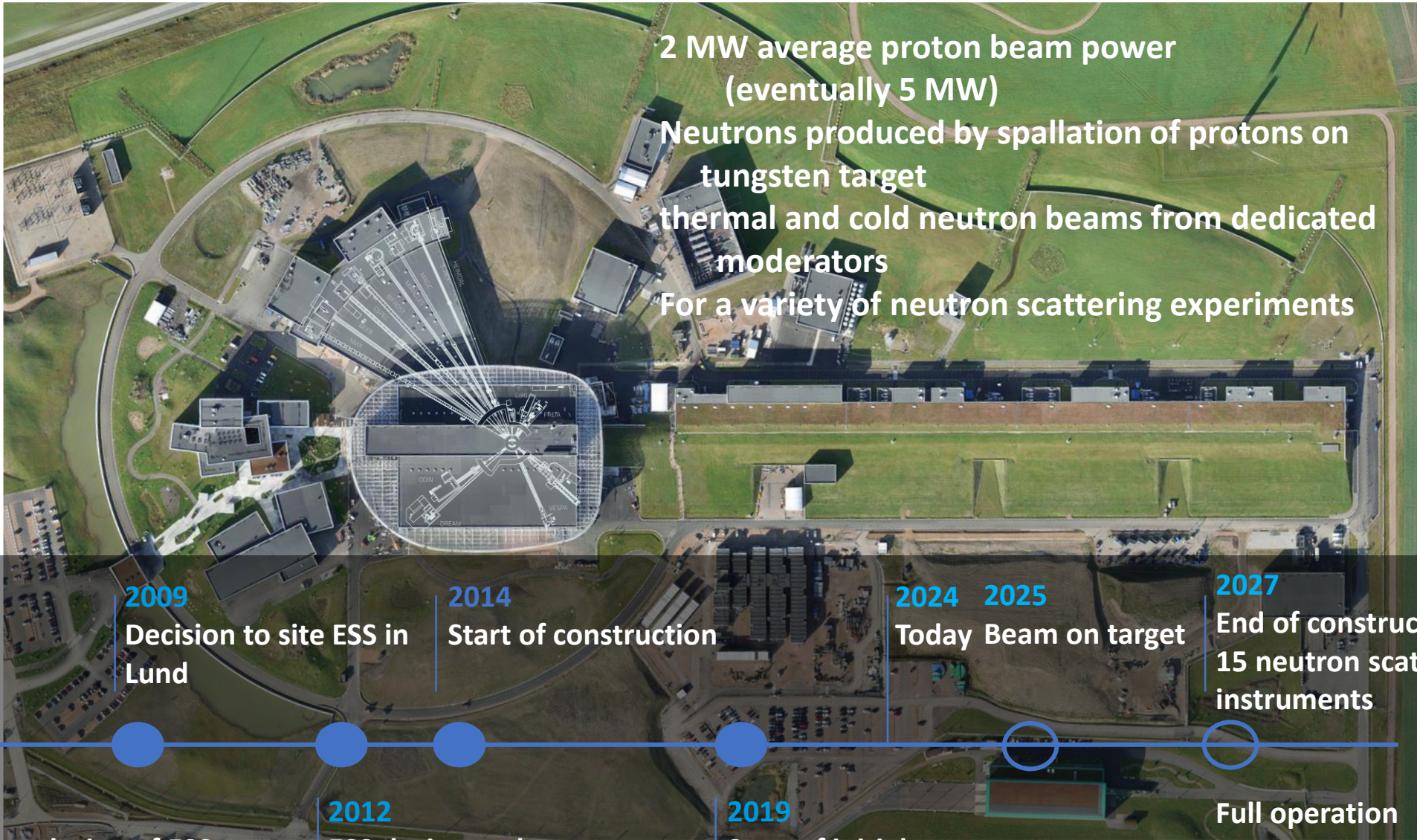


2 MW average proton beam power
(eventually 5 MW)

Neutrons produced by spallation of protons on tungsten target
thermal and cold neutron beams from dedicated moderators

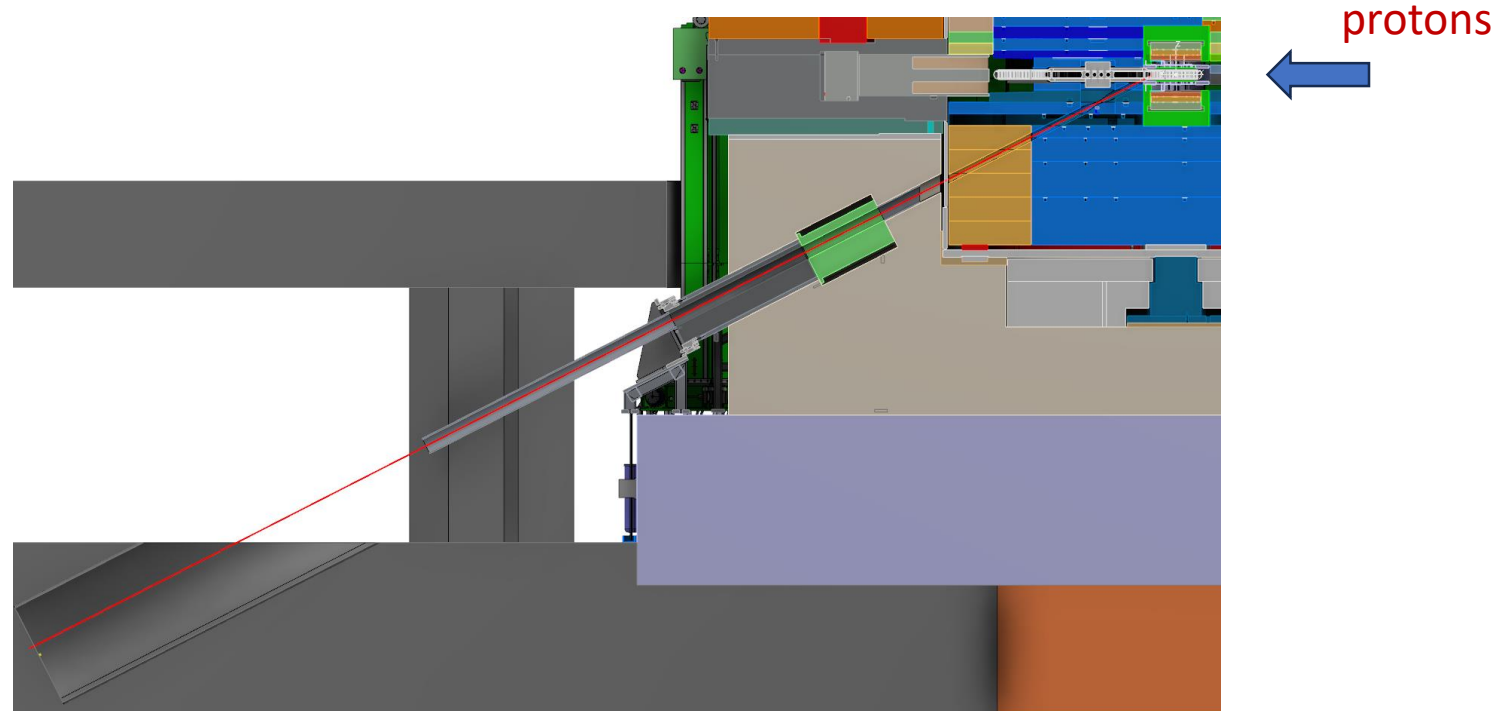
For a variety of neutron scattering experiments

ESS European Spallation Source in Lund, Sweden

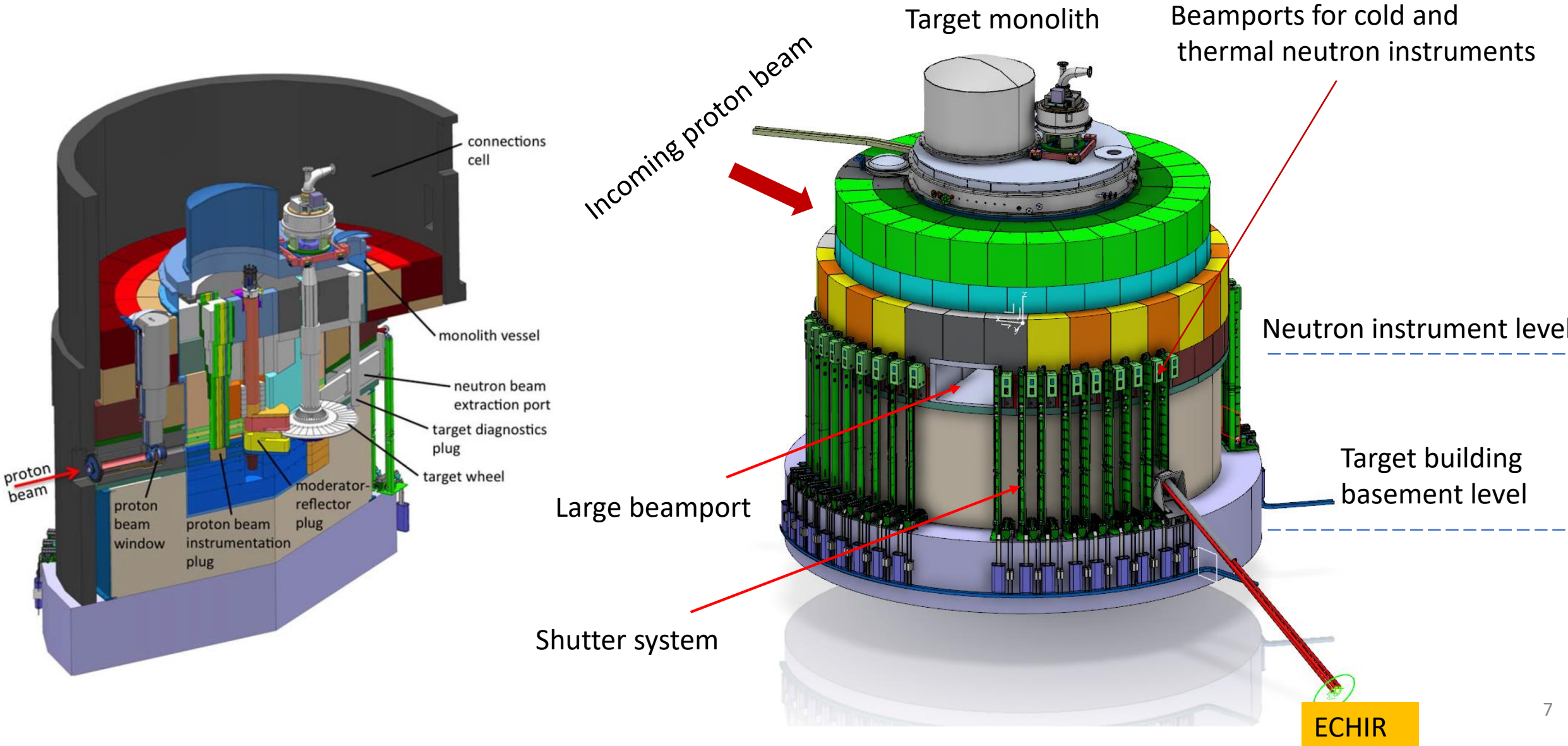


The European Chip IRradiation (ECHIR) concept

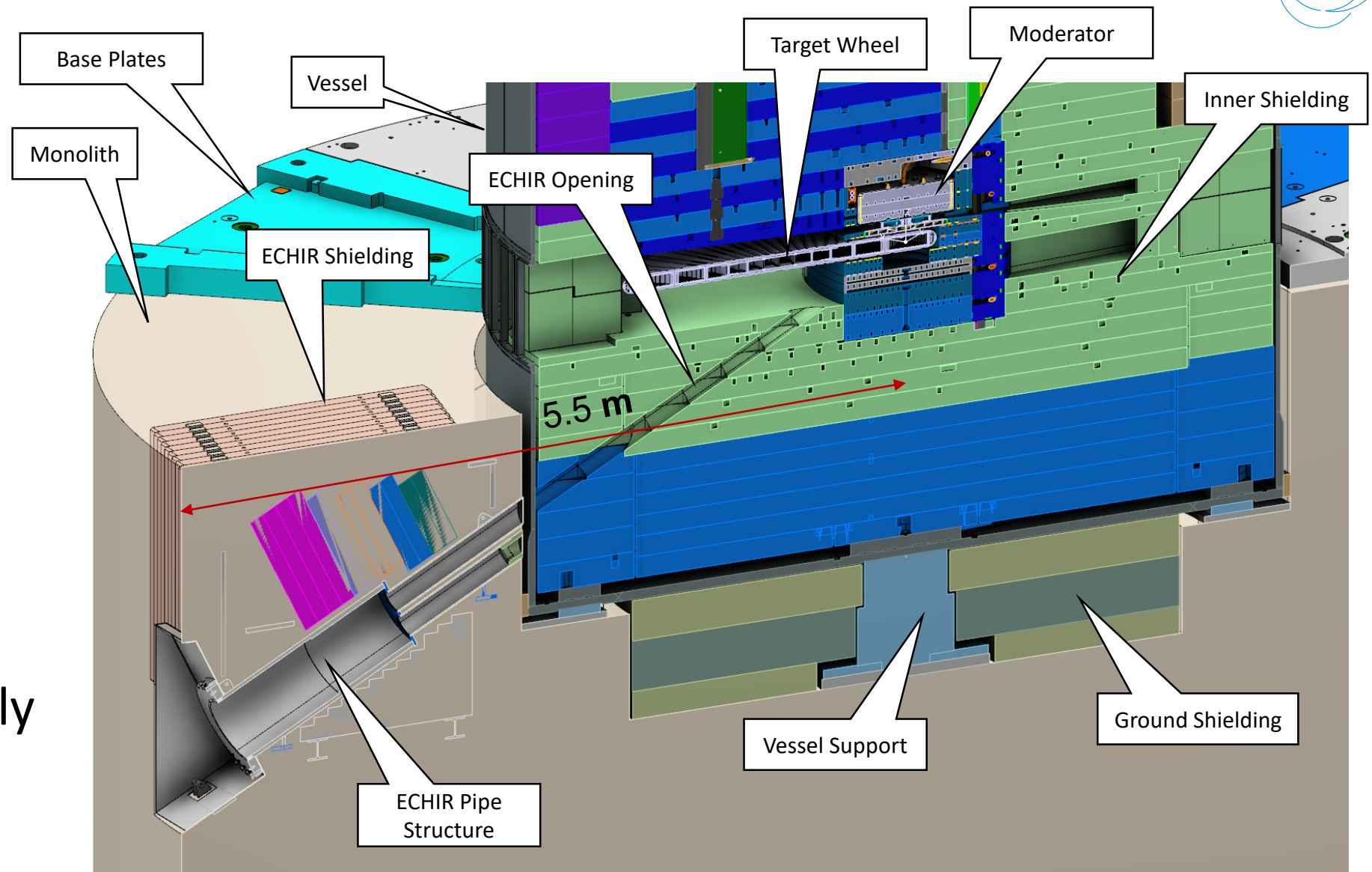
- Proposed by CNR (italian Consiglio Nazionale delle Ricerche) in early 2010's
- A chip irradiation facility for single event tests, in synergy with CHIPIR and other facilities
- Design carried out in 2014-16
- Several options considered
- Most advantageous option identified:
 - Beamline directed in forward direction with respect to incoming proton beam
 - Downward directed
- Installed necessary components for the future realization of the facility



ECHIR beamline, from target through monolith



ECHIR Opening Through Inner Shielding



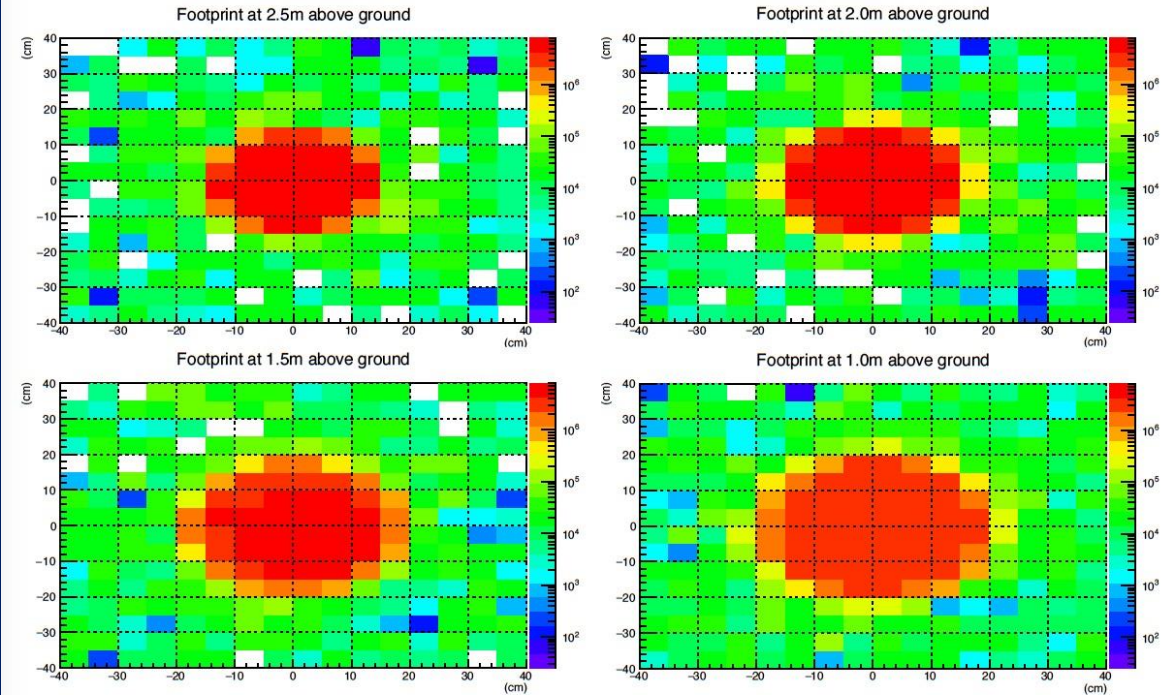
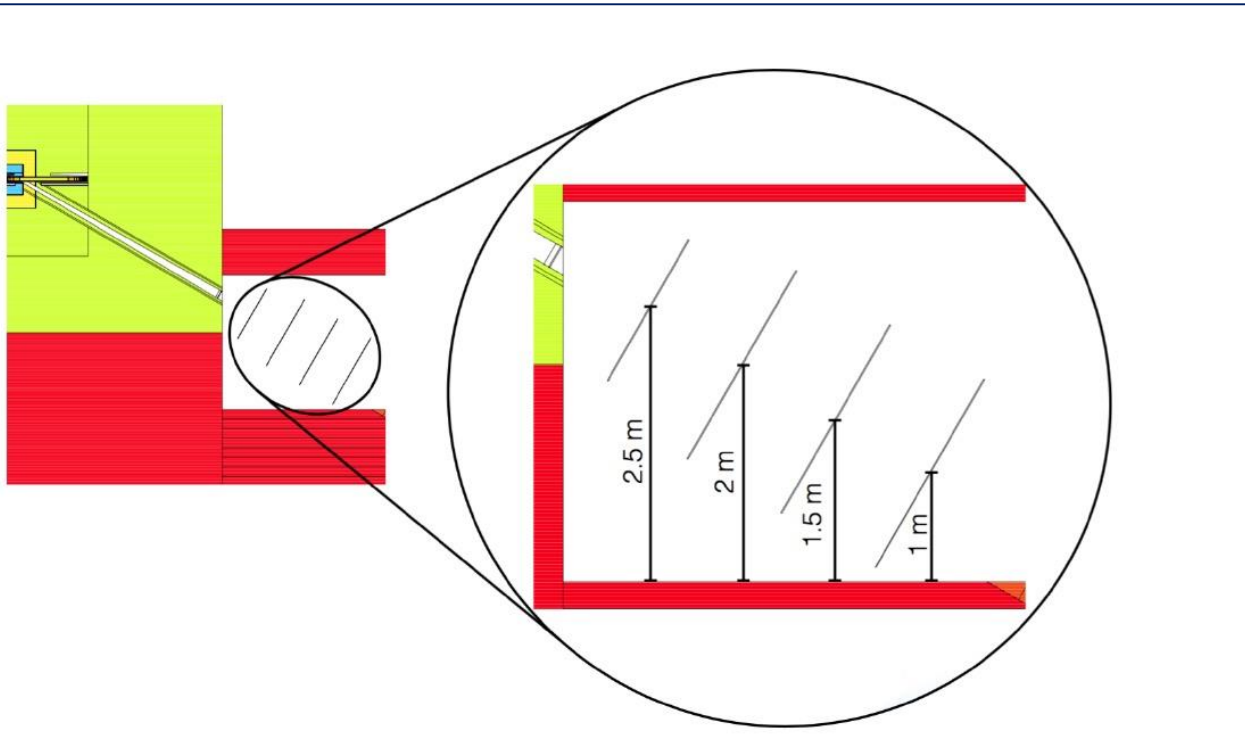
- 35° horizontally
- 27° vertically

ECHIR design



- Neutron spectrum
- Beam footprint
- Design of beam dump

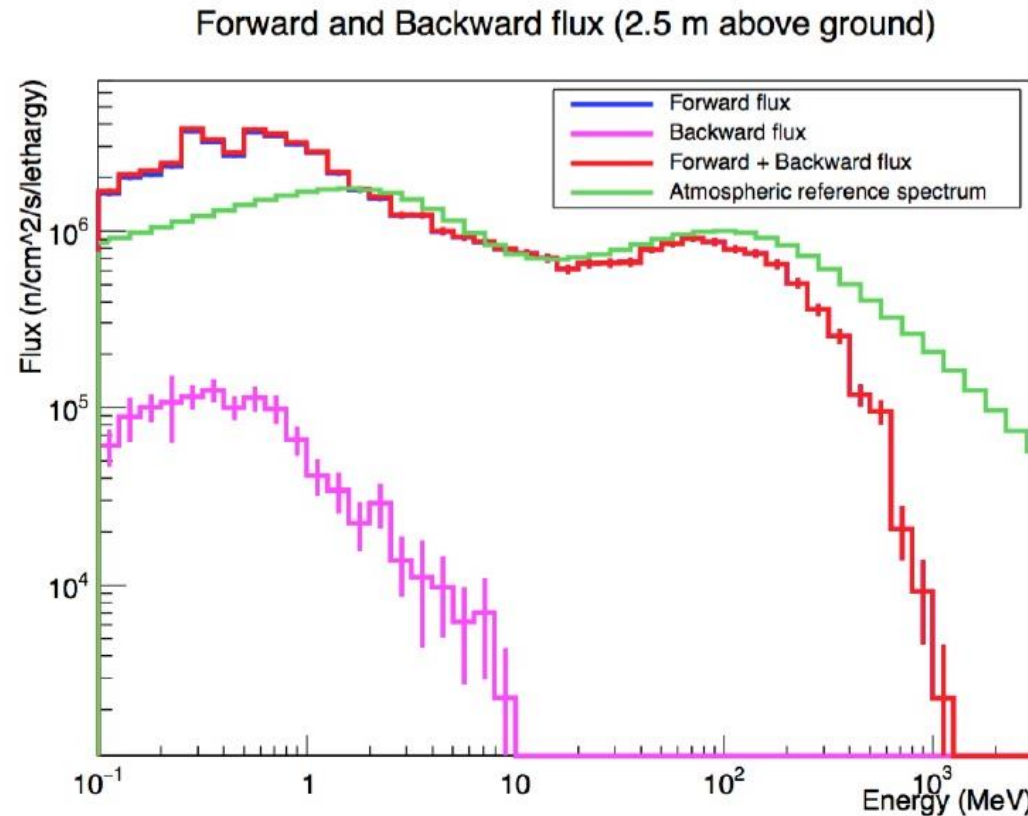
beam footprint



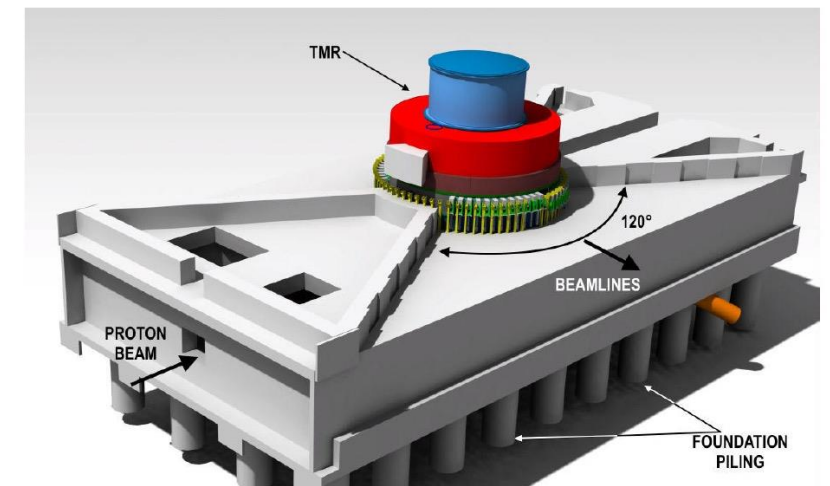
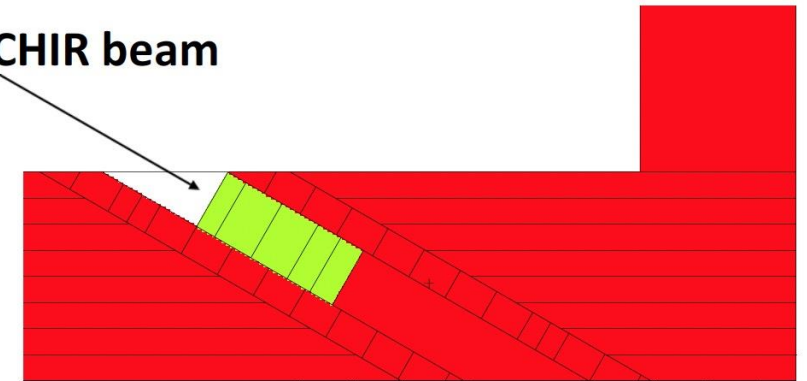
ECHIR spectrum at monolith surface compared with atmospheric spectrum



Beam dump



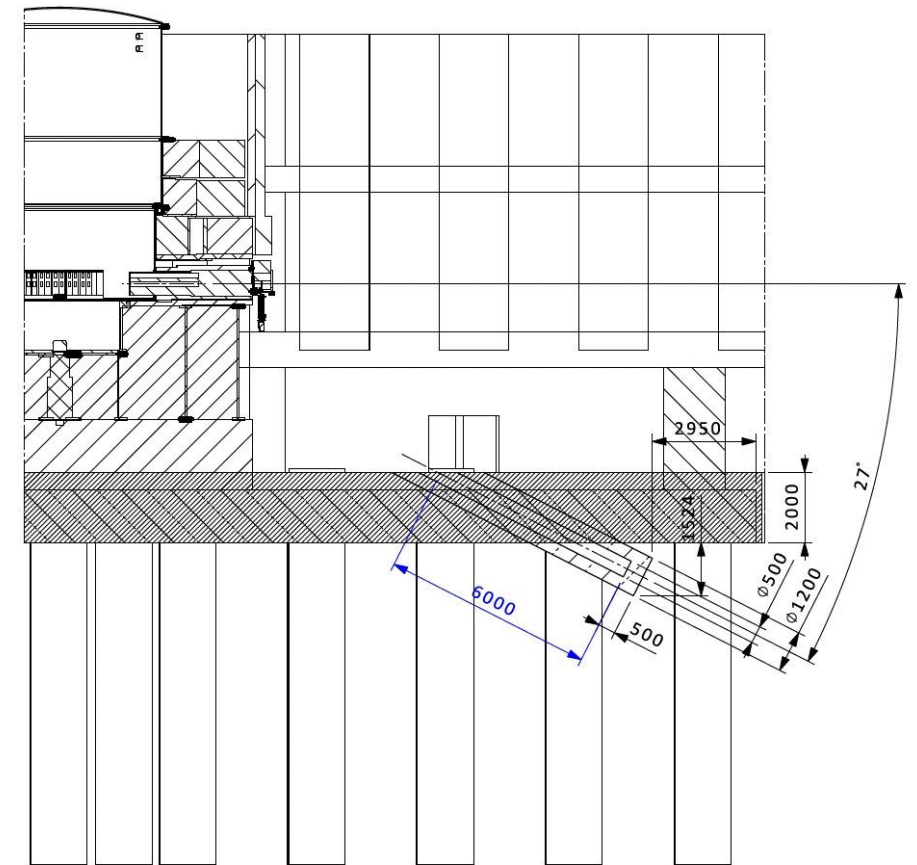
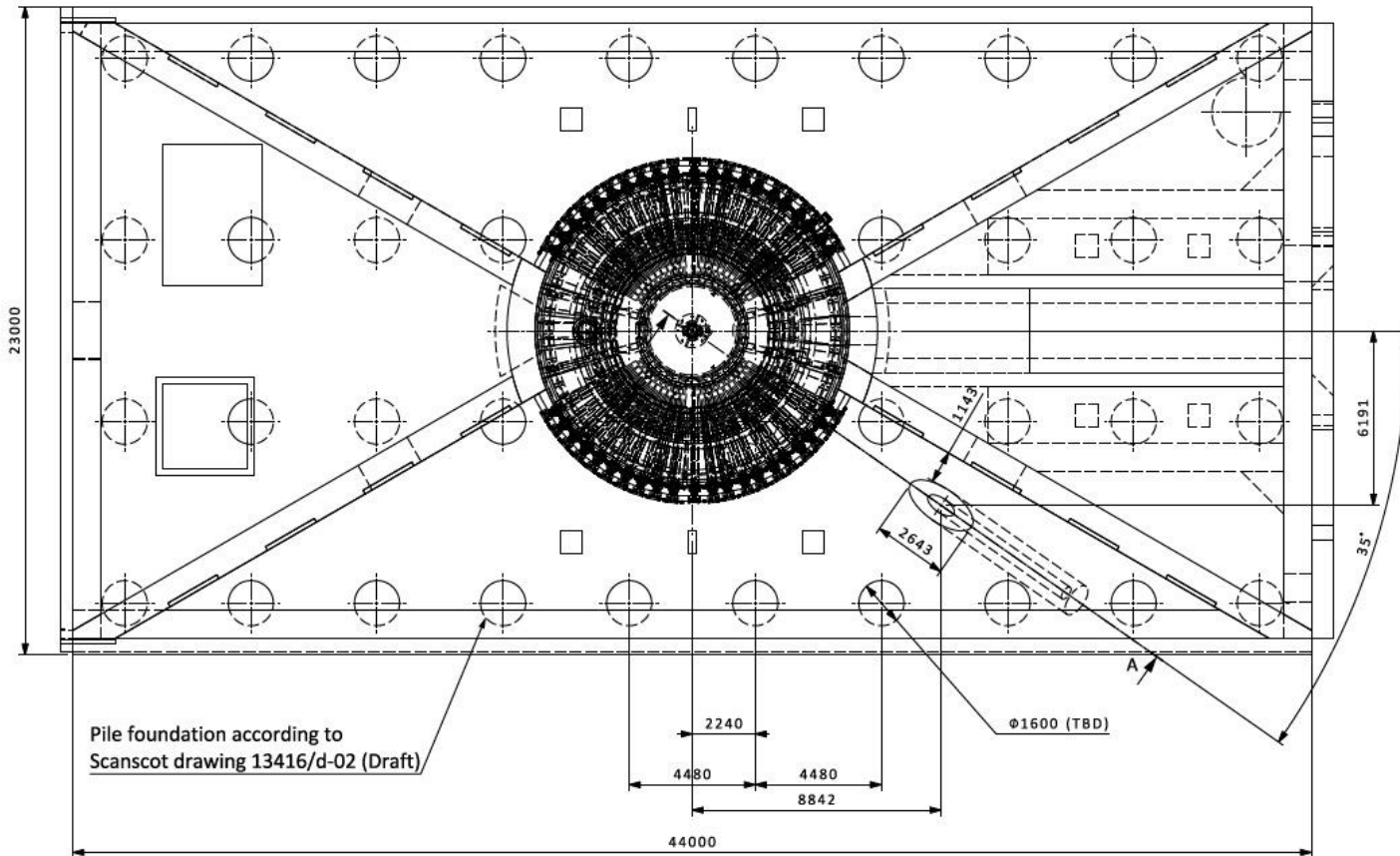
ECHIR beam



Atmospheric flux multiplied by 10^9 to match ECHIR spectrum

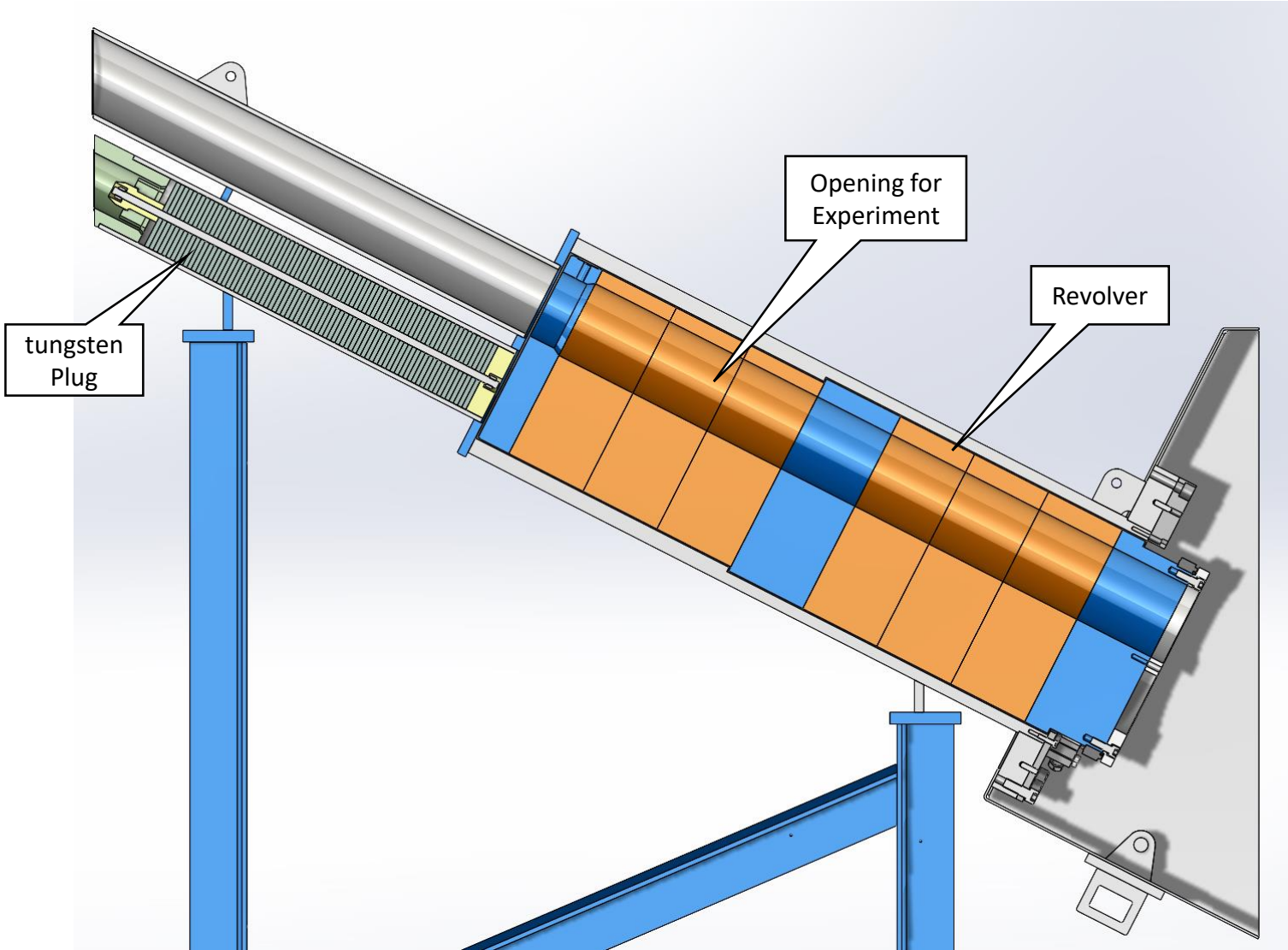
ECHIR installed components

- Beam line with shutter
- Beam dump

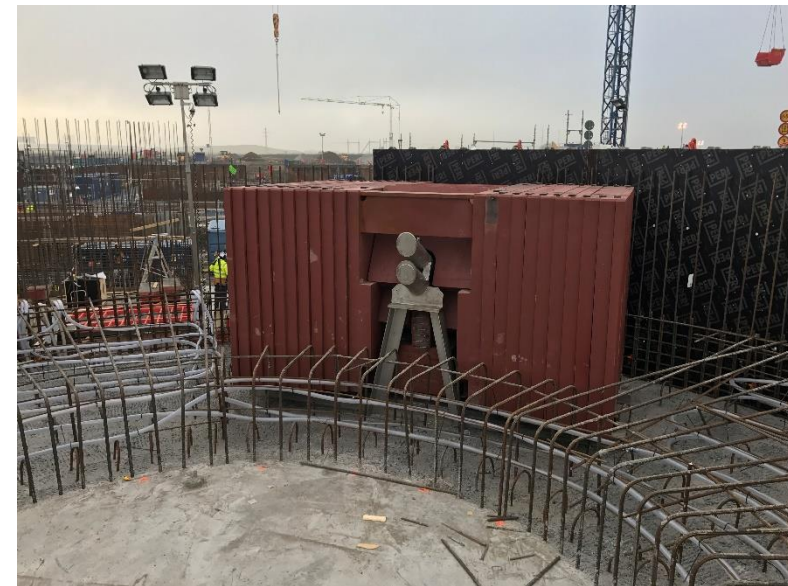
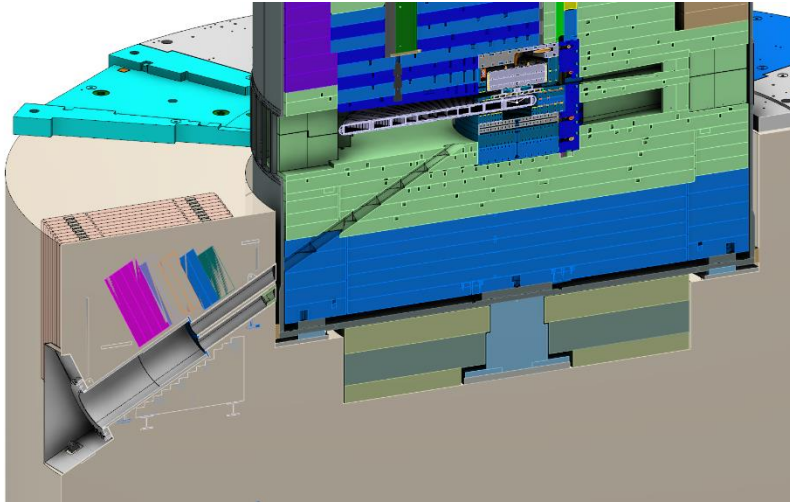


SECTION A-A (1:100)
(Rotated 35 degree)

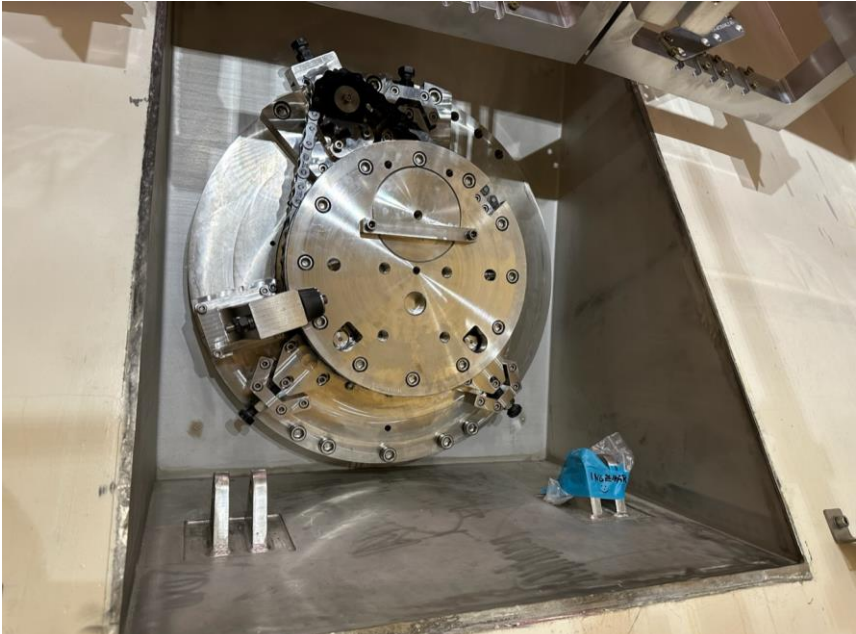
ECHIR Revolver system



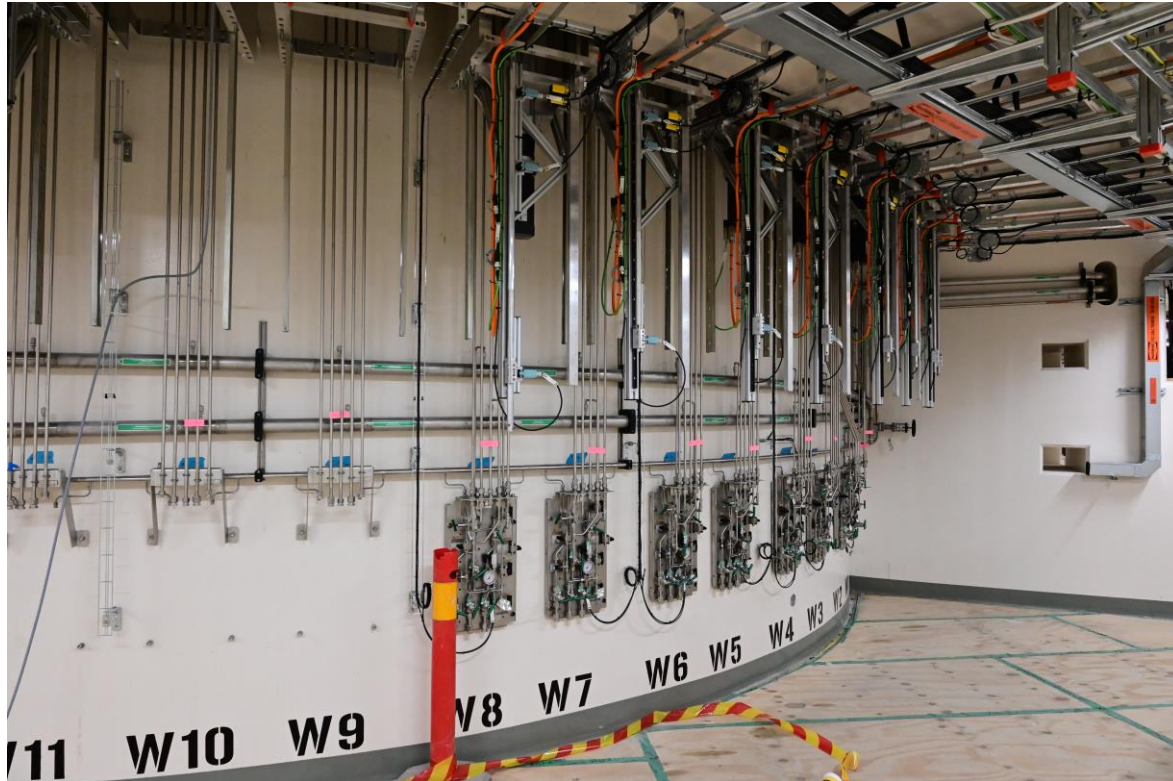
ECHIR structure inside monolith



ECHIR Revolver installation



ECHIR location



Summary

The components for a beamline for chip irradiation at ESS (ECHIR) have been designed.

The following components are installed:

- in-monolith beam extraction pipe with shutter
- beam dump

This provision will make possible a future high-flux fast neutron chip irradiation facility at ESS