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ANU HIAF 14UD

Enhanced beam injection for HIAF

P. Linardakis, N. Lobanov, T. Tunningley, B. Tranter, S. Battisson, B. Graham, T. Kitchen, J. Heighway, D. Tempra

Accelerator Technology Forum 2020

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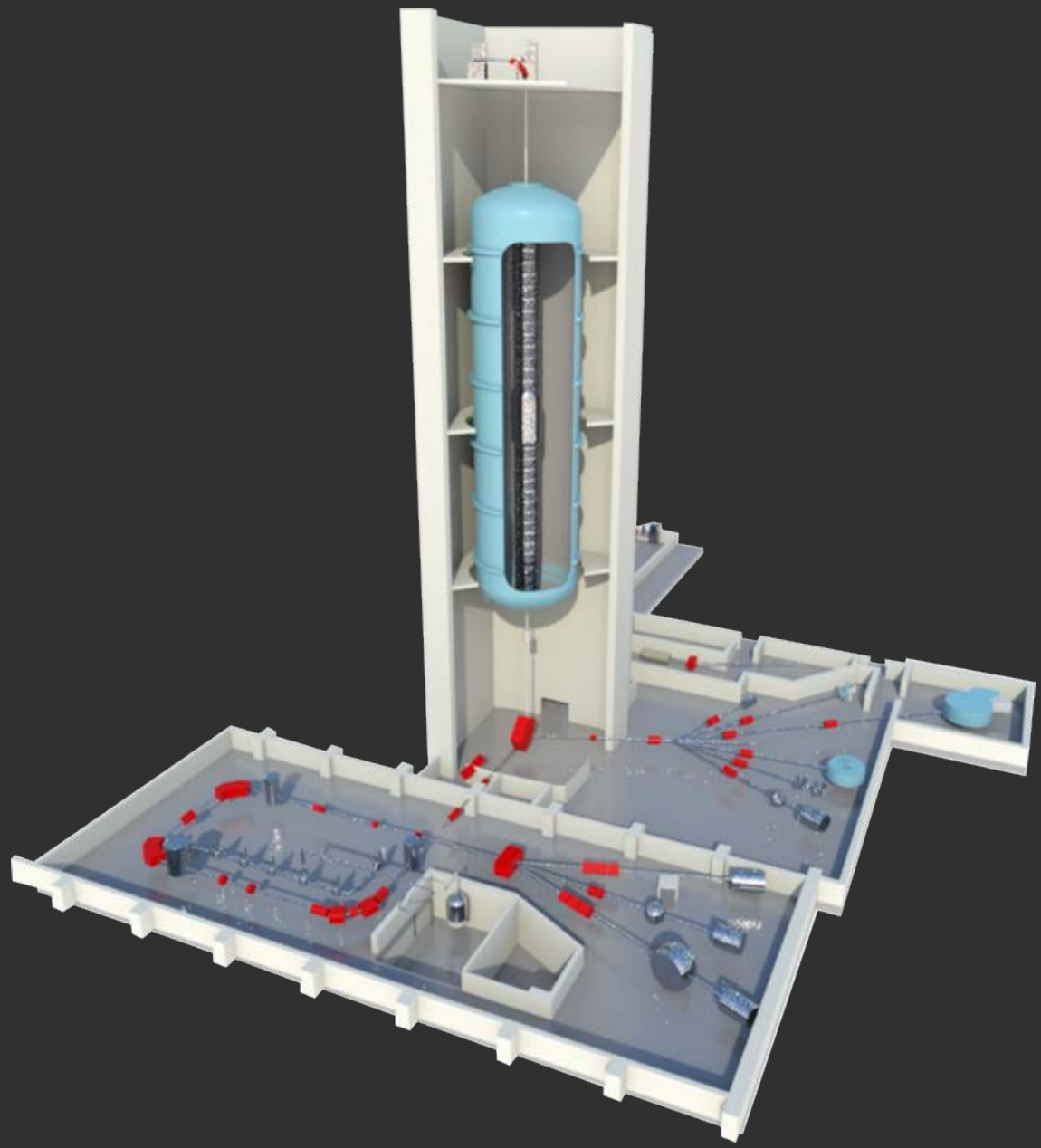

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Existing ion sources

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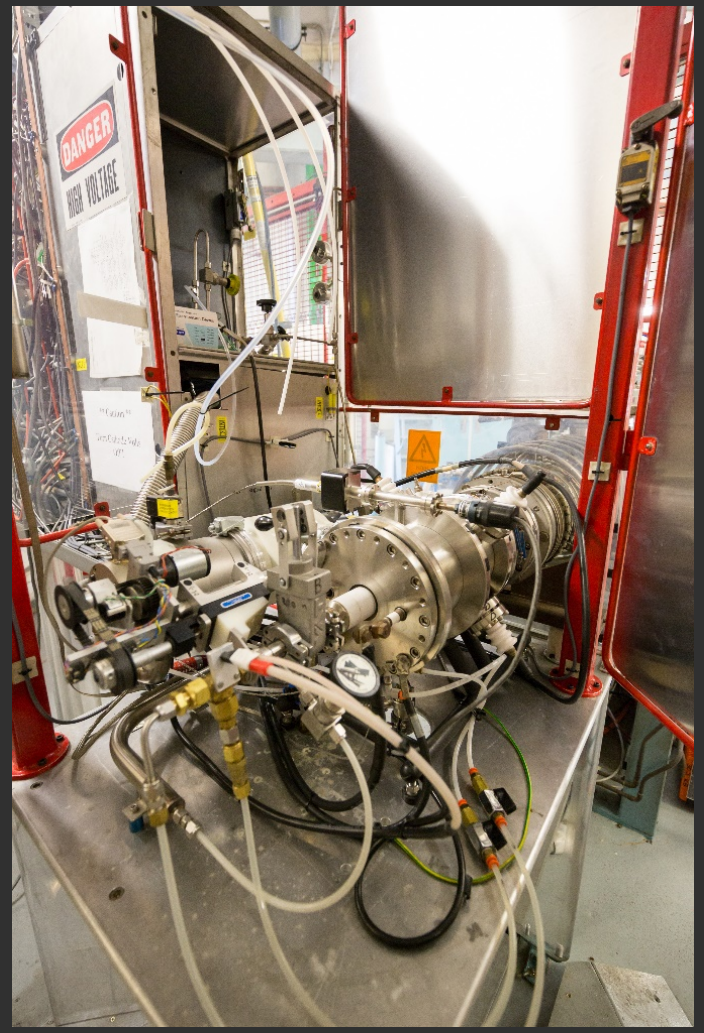
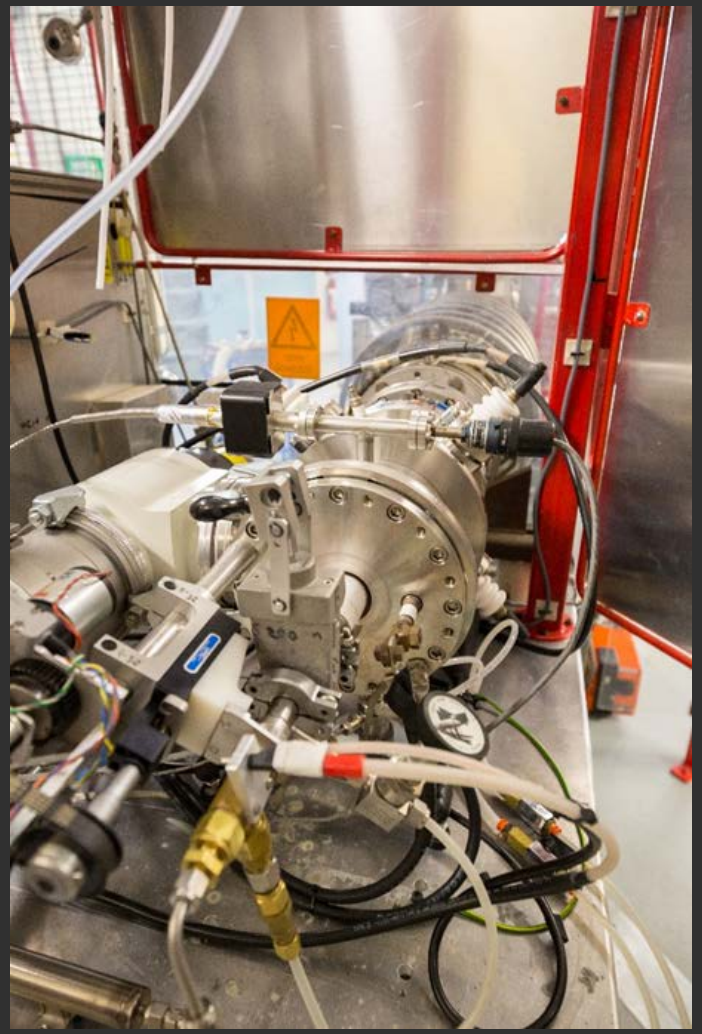
SSNICS source





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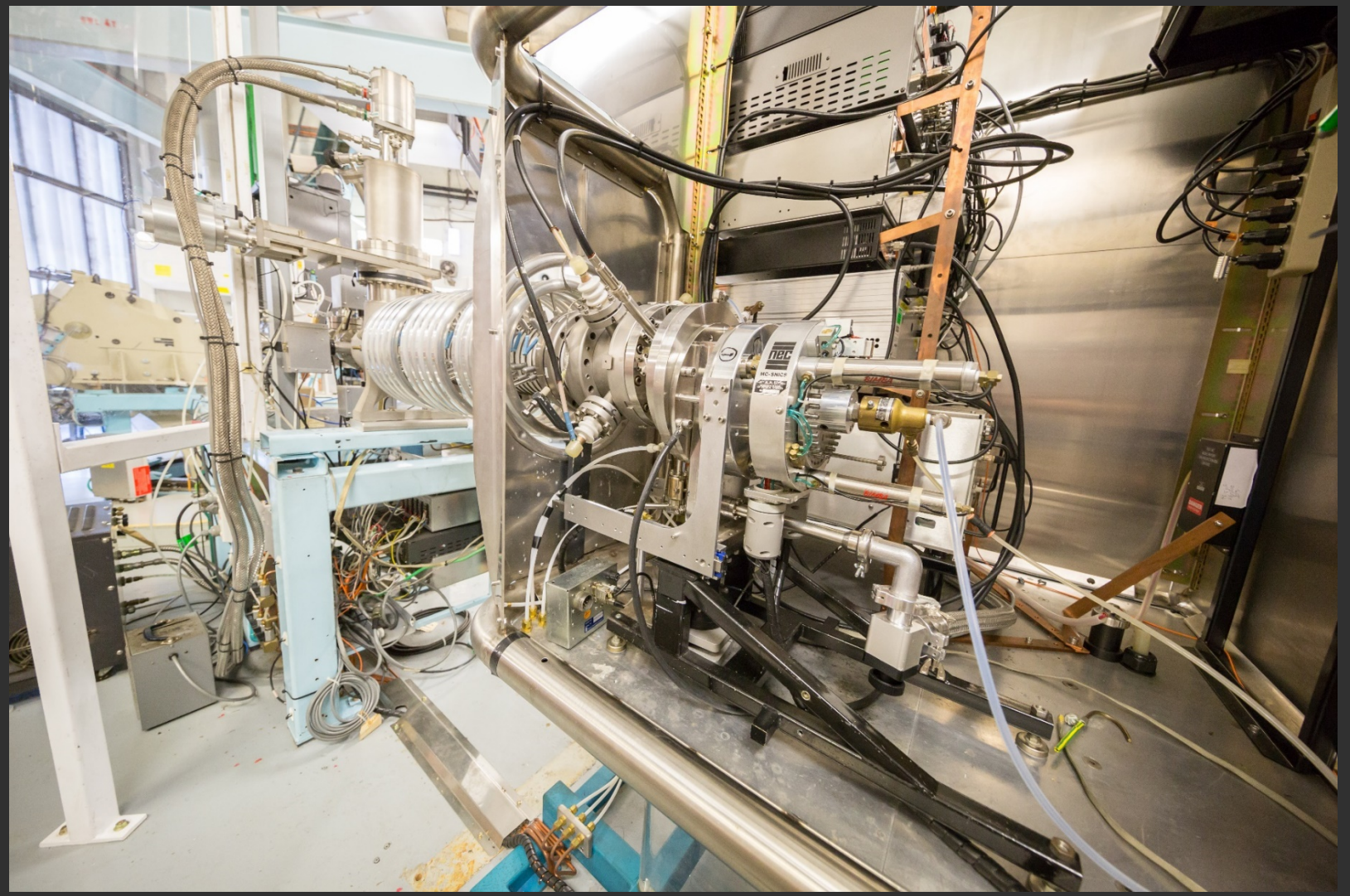
MSNICS source



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Motivation

1. The sensitivity of AMS for heavier nuclide detection is currently constrained by high backgrounds from neighbouring isotopes due to low- and high-energy tails

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1. The sensitivity of AMS for heavier nuclide detection is currently constrained by high backgrounds from neighbouring isotopes due to low- and high-energy tails
2. Users are demanding 3He and 4He (alpha particles) for research problems

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The project

- Installation of a new ion source to produce negative helium ions (ECR/RB ion source)

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- Installation of a new 110° electrostatic analyser (ESA)

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- Repositioning the existing multi-cathode MSNICS ion source to integrate with the ESA

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The project

- Installation of a new ion source to produce negative helium ions (ECR/RB ion source)
- Installation of a new 110° electrostatic analyser (ESA)
- Repositioning the existing multi-cathode MSNICS ion source to integrate with the ESA
- Plus additional associated work
  - Installation of new safety cages around all three ion sources
  - Reconfiguration and upgrade of the high-voltage functional safety interlock system

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Outcomes will enable

- improved isotope tracing in environmental applications;
- assessment of detectors for dark matter searches;
- searches for interstellar particle influx to the Earth;
- new research into the quantum mechanics of nuclei and;
- new astrophysics and medical applications.

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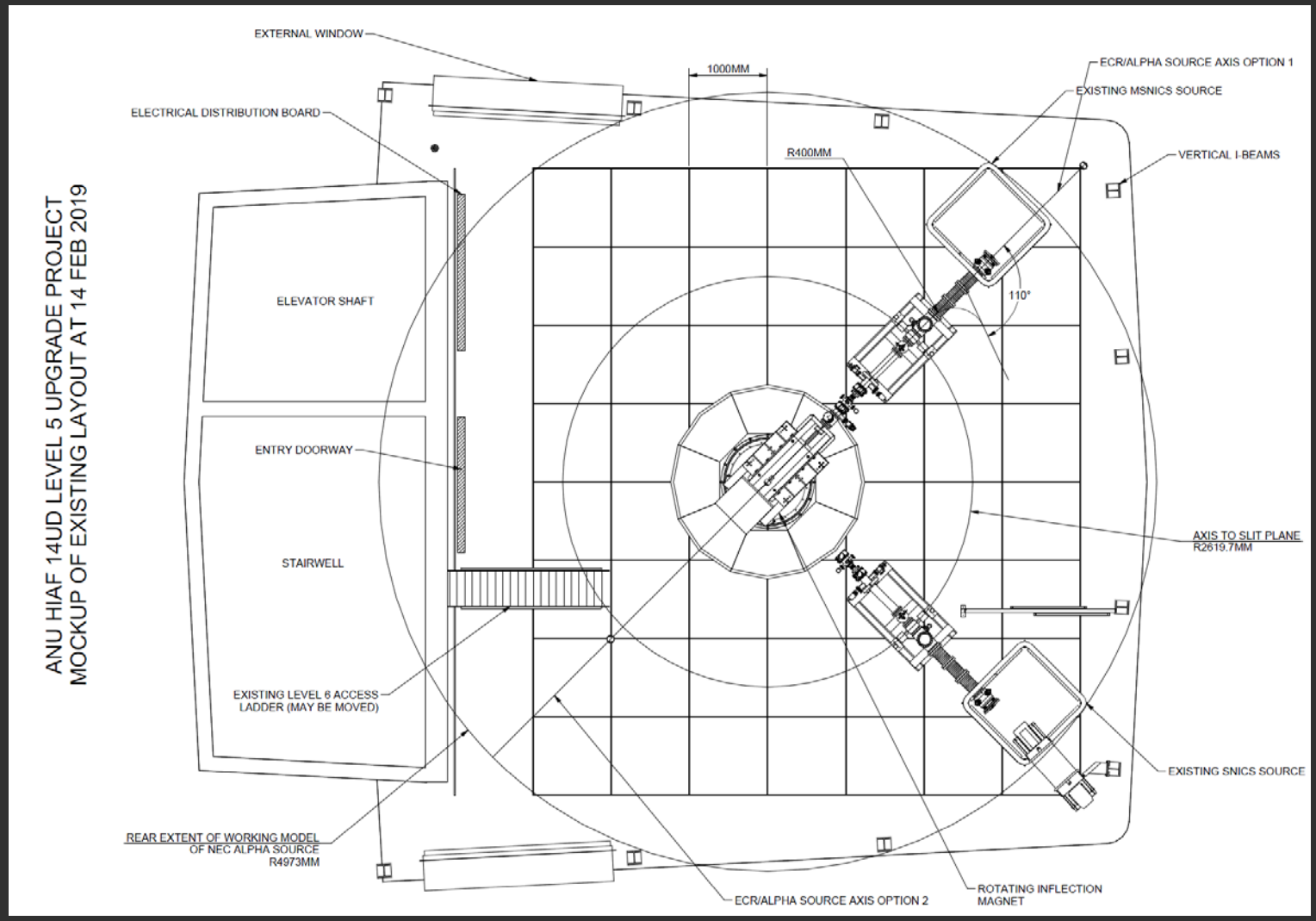
Existing layout



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It’s a busy area

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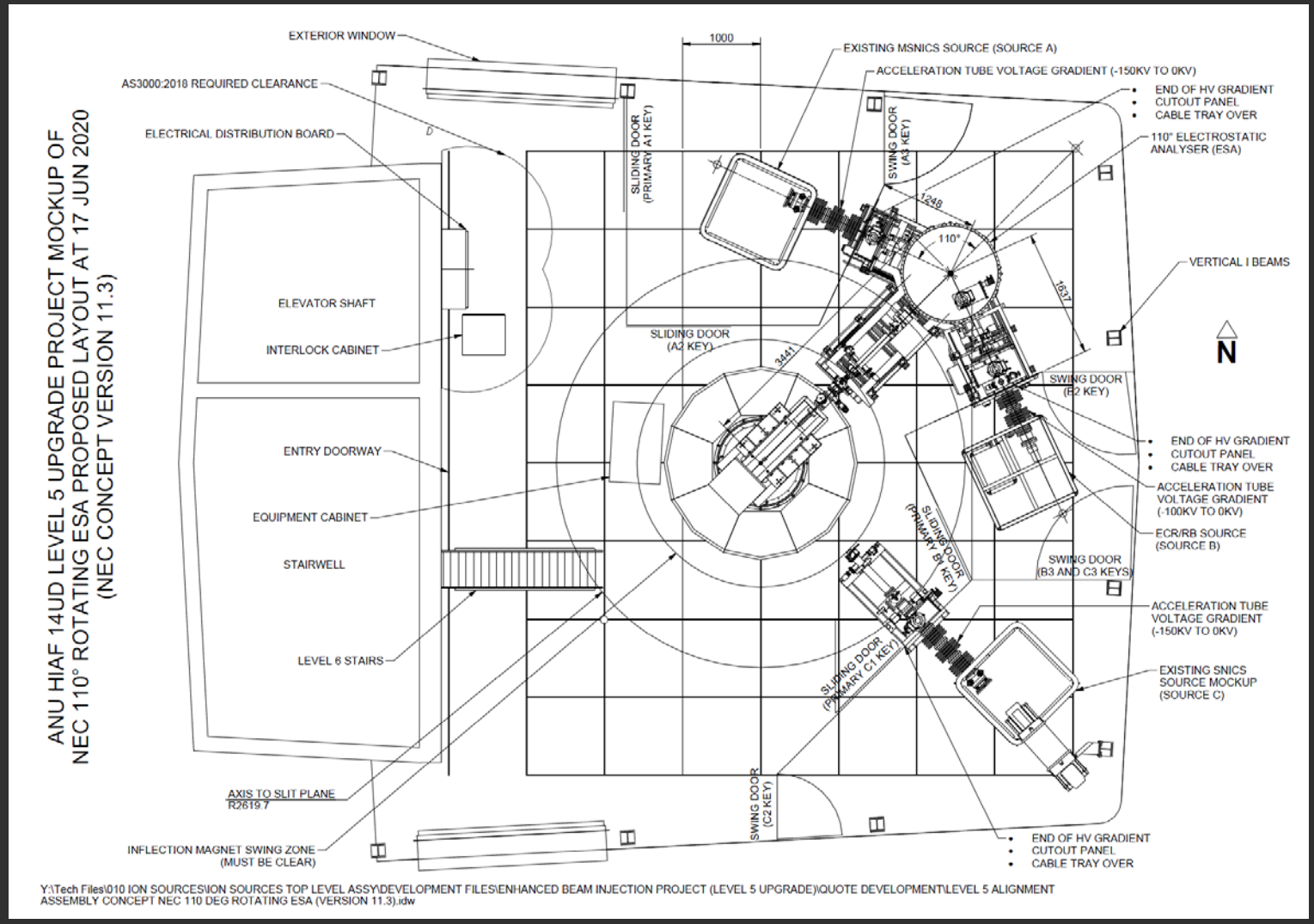
Planned layout



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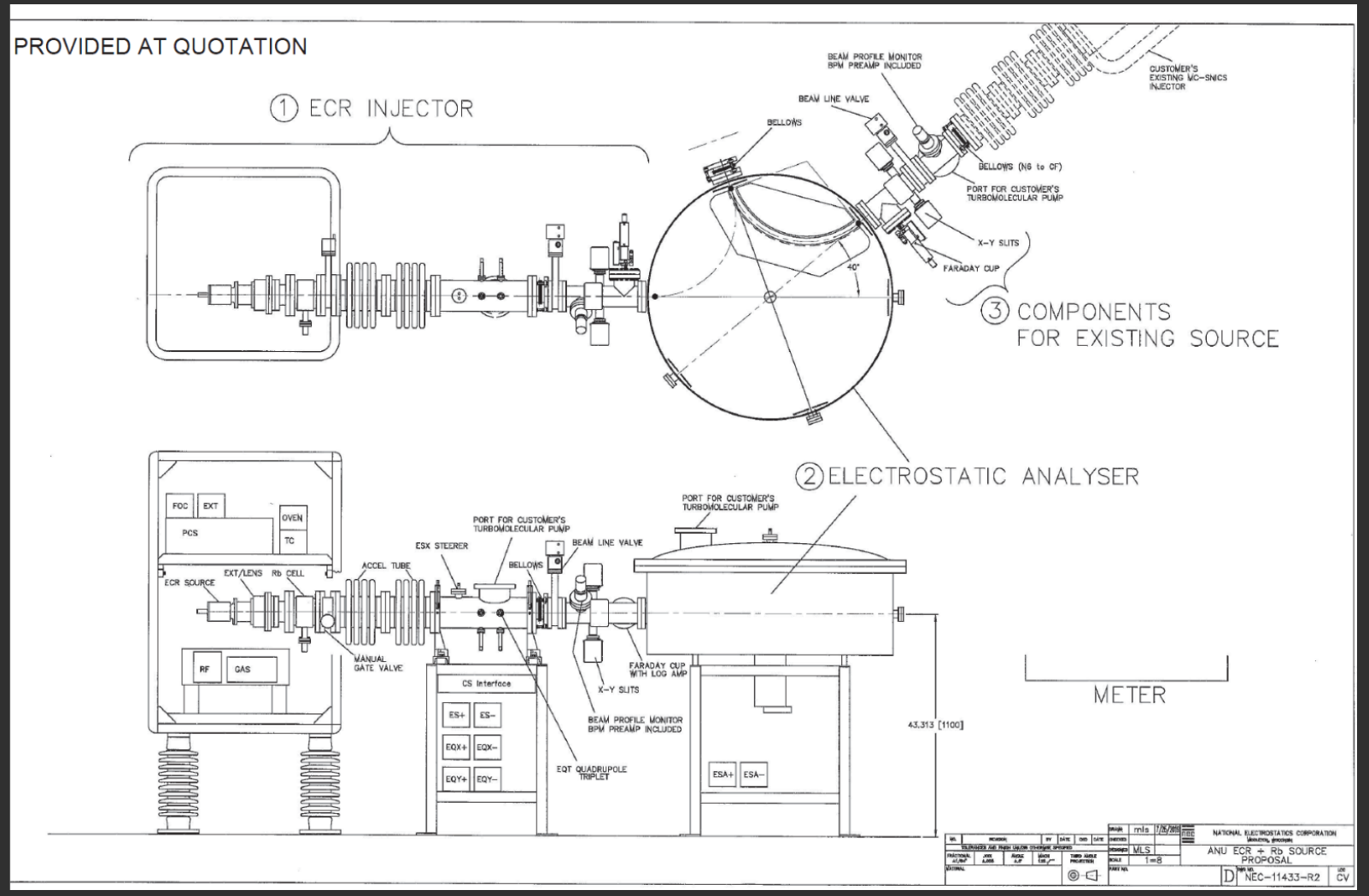
National Electrostatics Corporation Proposal



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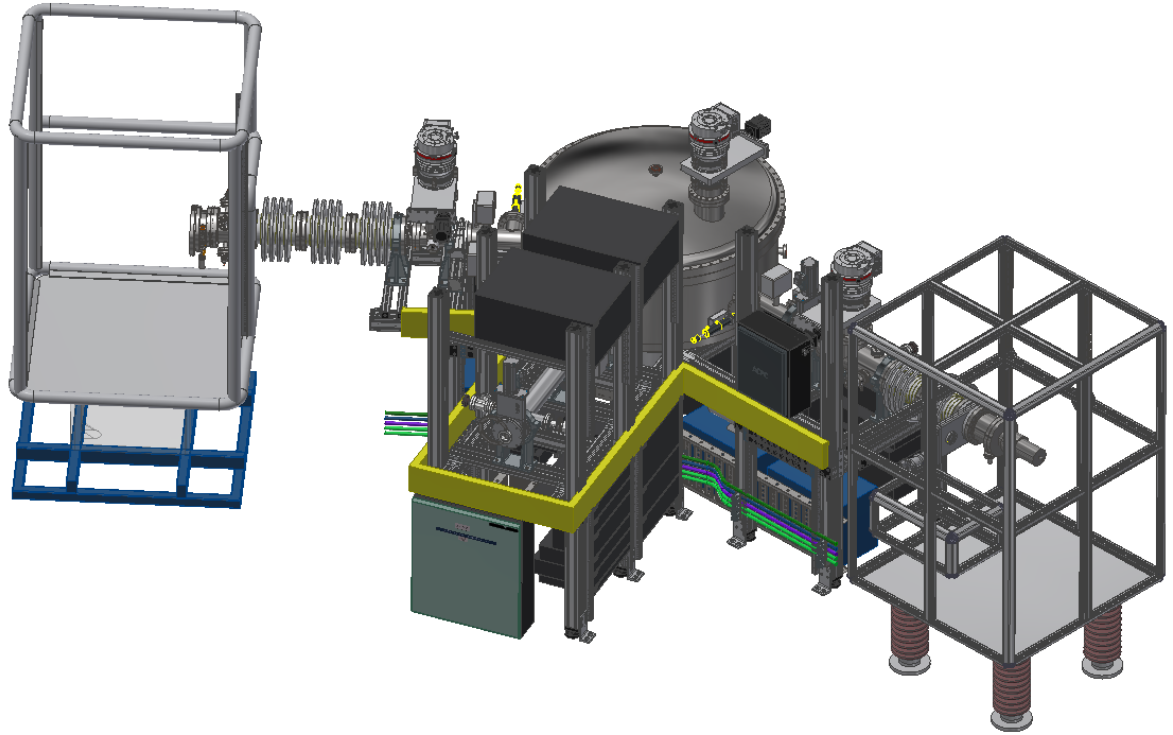
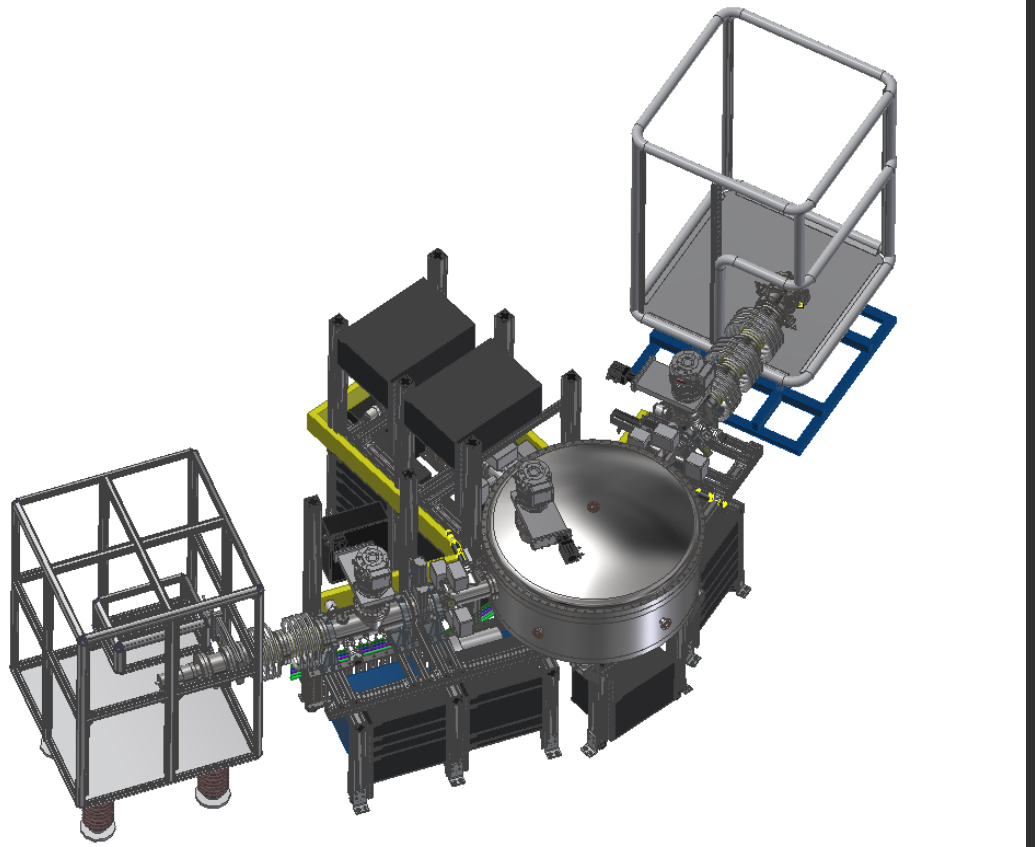
Integration





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ECR source

- Pantechnik Monogan M-100
- 2.45 GHz 30W RF
- Rubidium charge exchange cell

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Control and I/O

- Integration into existing EPICS control
- ADAM-5000 Series Modular I/O System
- ESA bouncing system (AccelNet)

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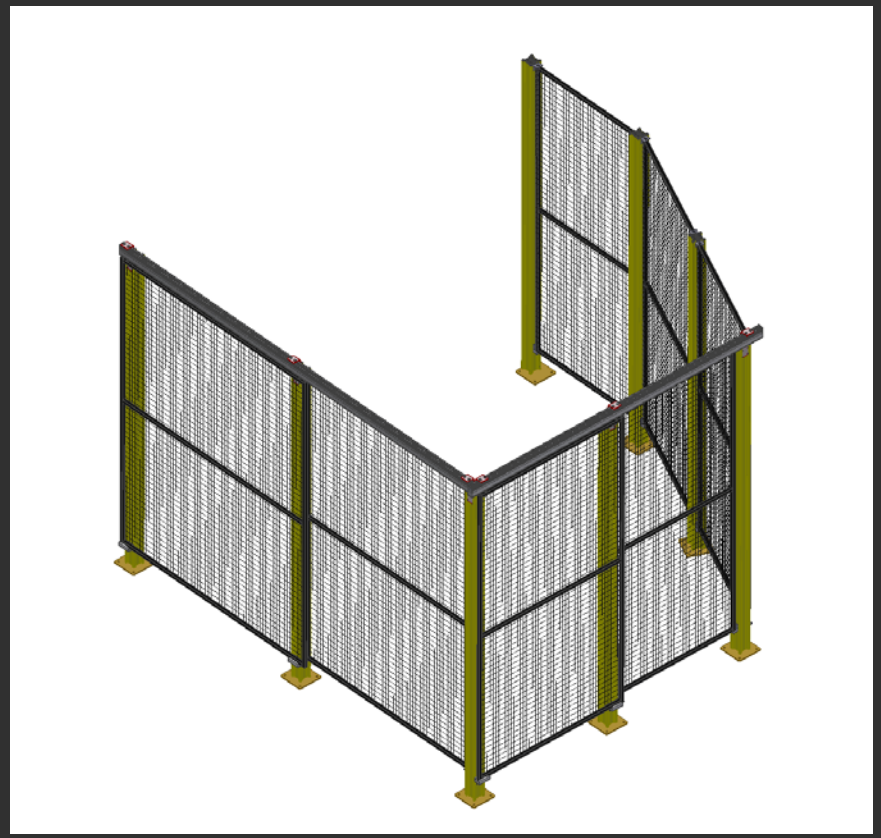
Functional safety systems



- AS/NZS 4024 Series (Safety of Machinery)
- AS 61508 Series (Functional safety of electrical/electronic/programmable electronic safety-related systems).

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Timeline and challenges to it

- Original planned delivery in October 2020
  - But COVID (NEC is US based)
- System design pretty much finalised
- Building infrastructure upgrades
- Mid 2021?

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Thank you