

New Developments at iThemba LABS



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Outline

- Current status of the accelerators and refurbishment projects
- Outcome of feasibility study of a radioactive beam and isotope production facility



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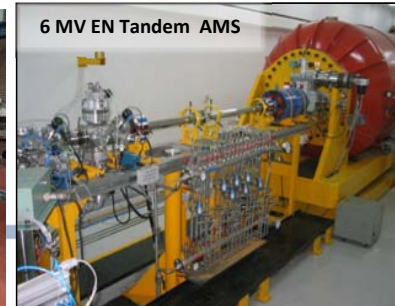
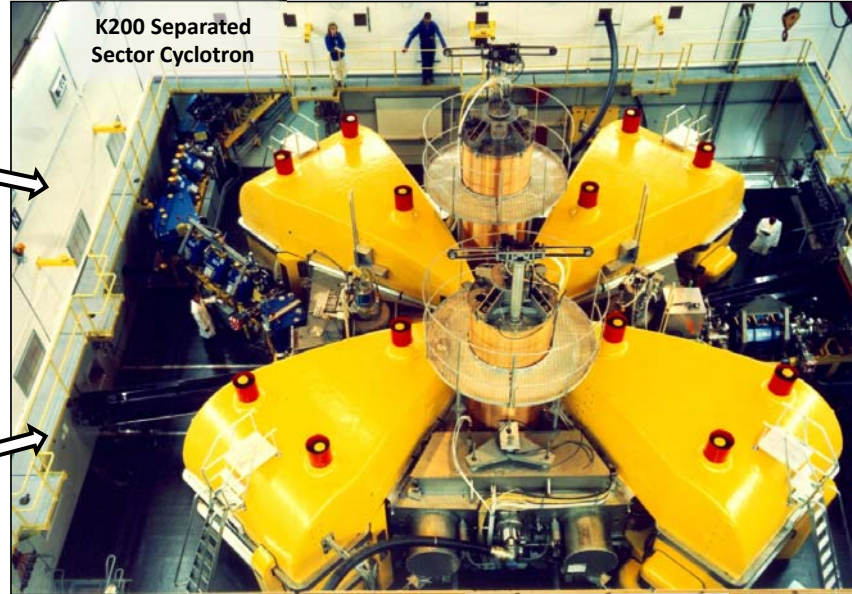
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Accelerators at iThemba LABS



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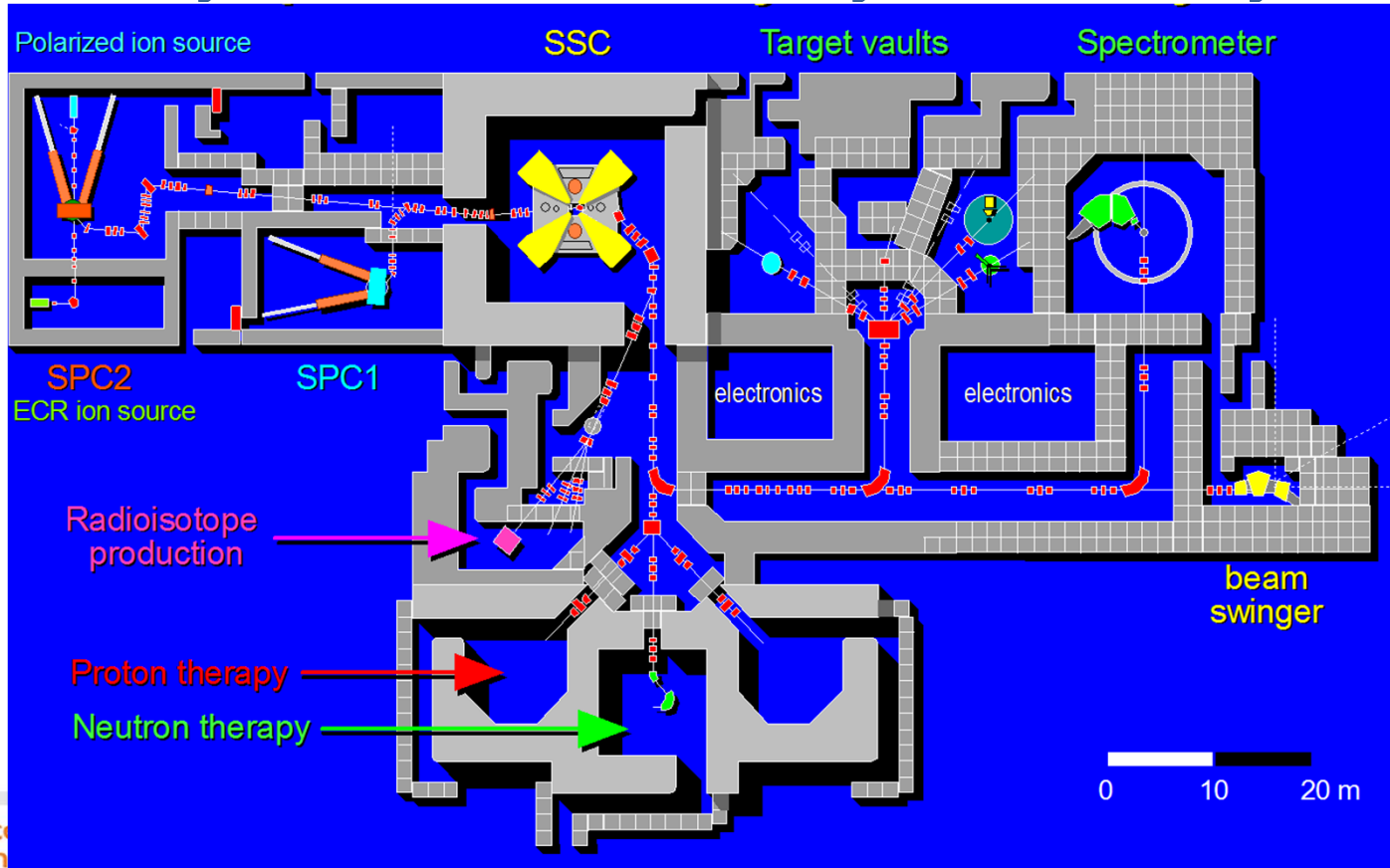
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Layout of iThemba LABS Cyclotron Facility



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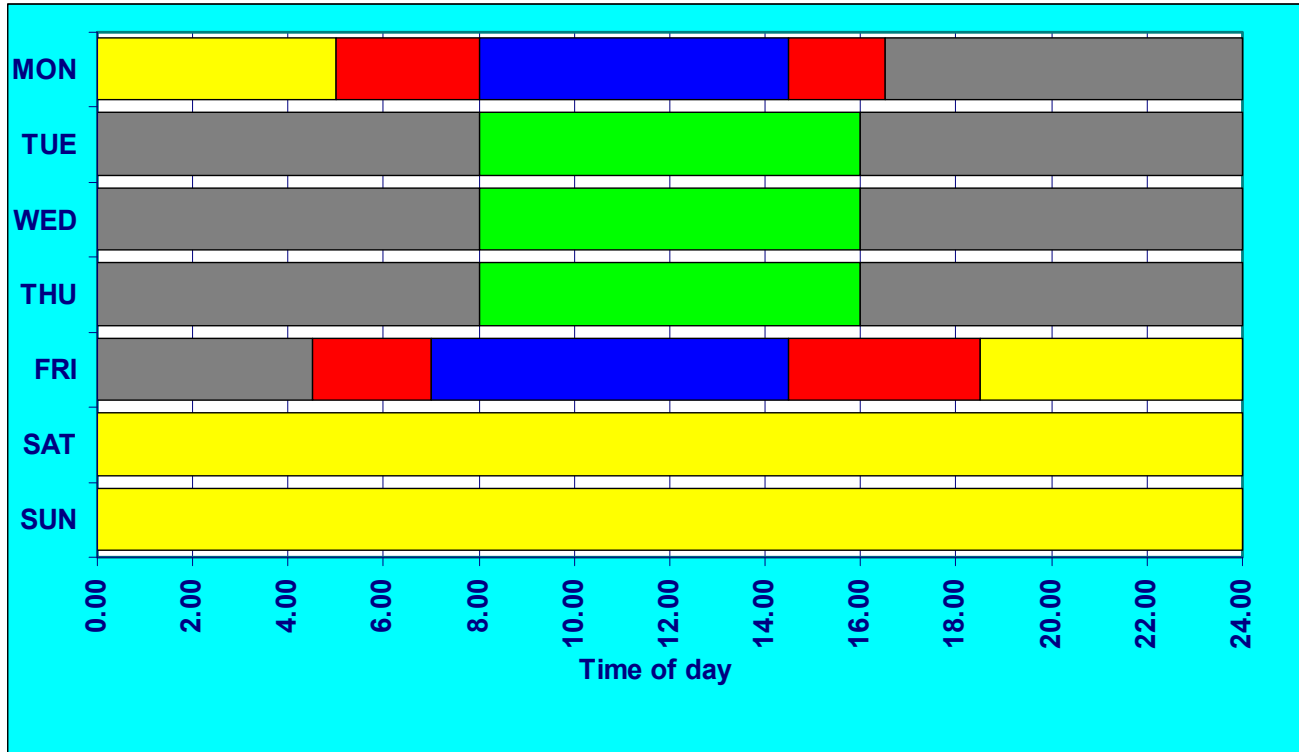
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BEAM SCHEDULE



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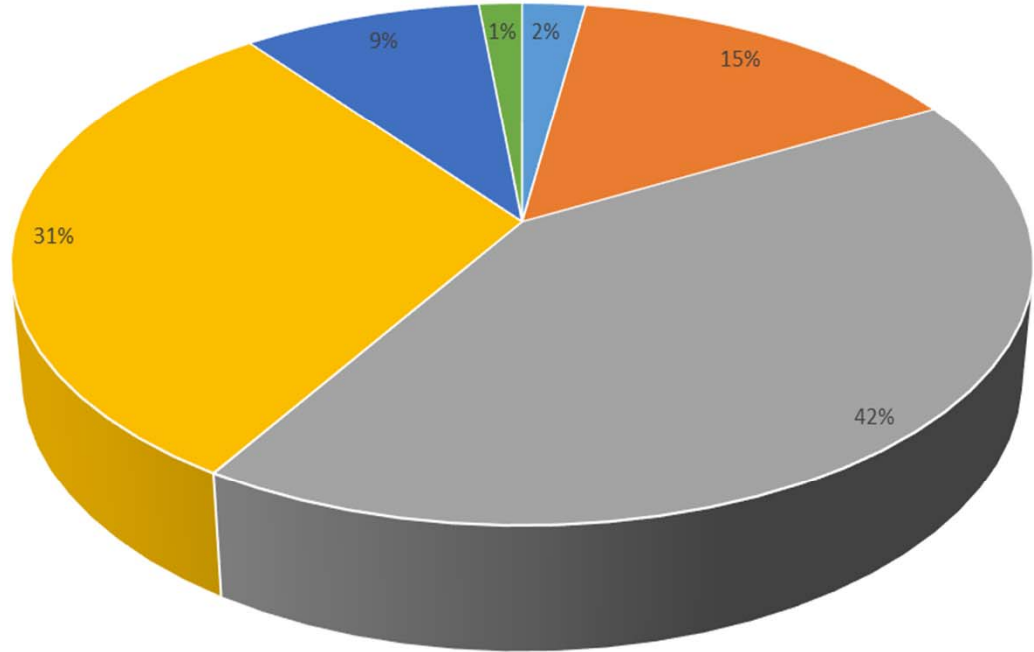
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Beam Time Loss for the Financial Year 2015/2016

RF	42%
Power failures	31%
Injection components	15%
Power supplies	9%
Diagnostics	2%
Control	1%



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New Digital Low Level RF Control System



- **Modular Design**
- **Digitally programmable**
- **16 bit Amplitude resolution**
- **Operates between 5 and 100 MHz**
- **Programmable in steps of 1 μ Hz**
- **Phase resolution in steps of 0.0001 $^\circ$**
- **EPICS based**



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4.4 MVA Uninterruptible Power Supply New Battery Bank for the UPS



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New Cooling Towers 2014



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Chiller Replacement in September 2016



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Old Chillers & Pumps



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Implementation of an EPICS Control System

- Currently 60% of the control hardware is under EPICS control
- Adopted EtherCAT as our new industrial communication standard in 2015
- Put iThemba LABs at a new advantage in that we are able to easily deploy modern off-the-shelf hardware under EPICS control
- Beckhoff EtherCAT terminals
- Real-time industrial solution, available for 25 years
- Fully integrated with EPICS
- 1,000 distributed I/Os in 30 μ s



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Injector Cyclotron 1 – Replacement of water channels on the rf resonators

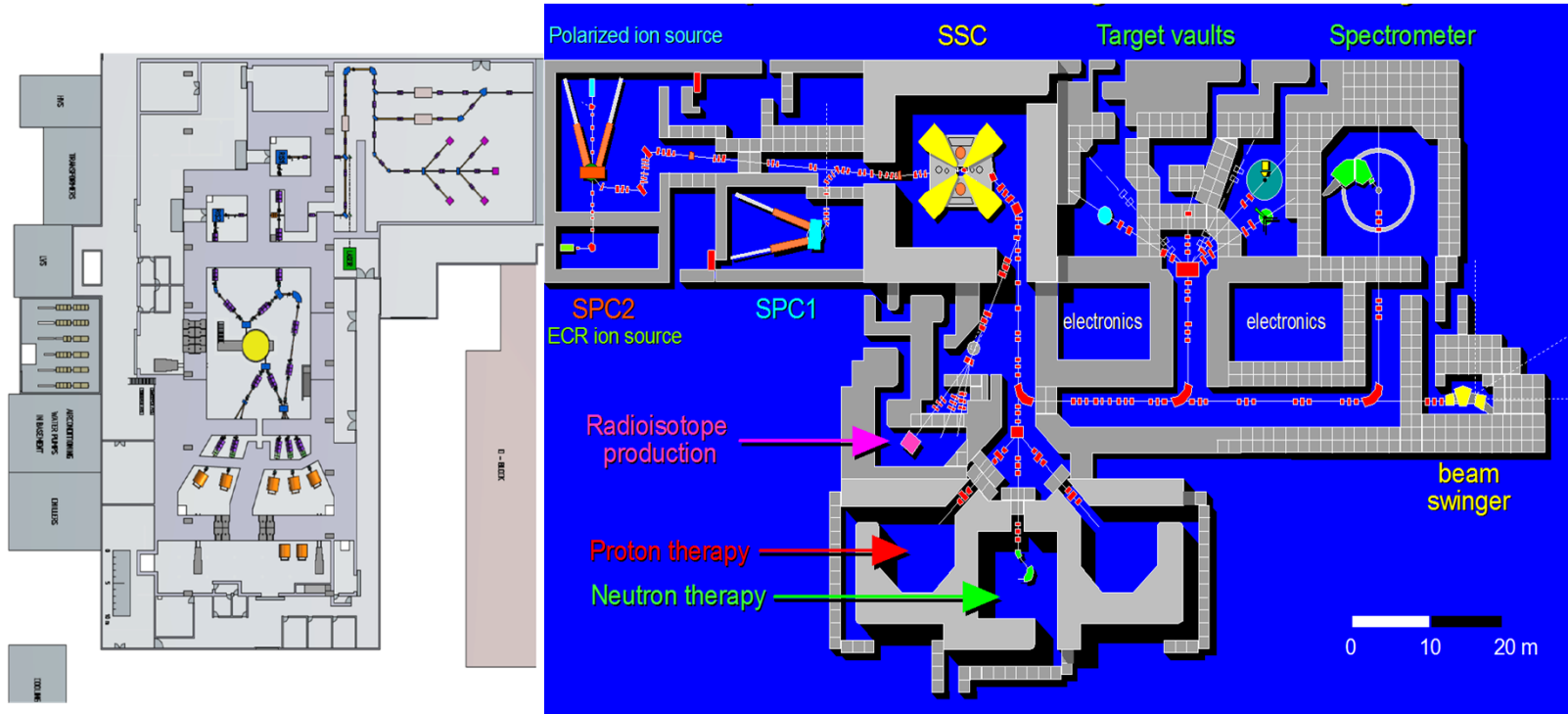


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Proposed Radioactive Ion Beam & Isotope Production Facility



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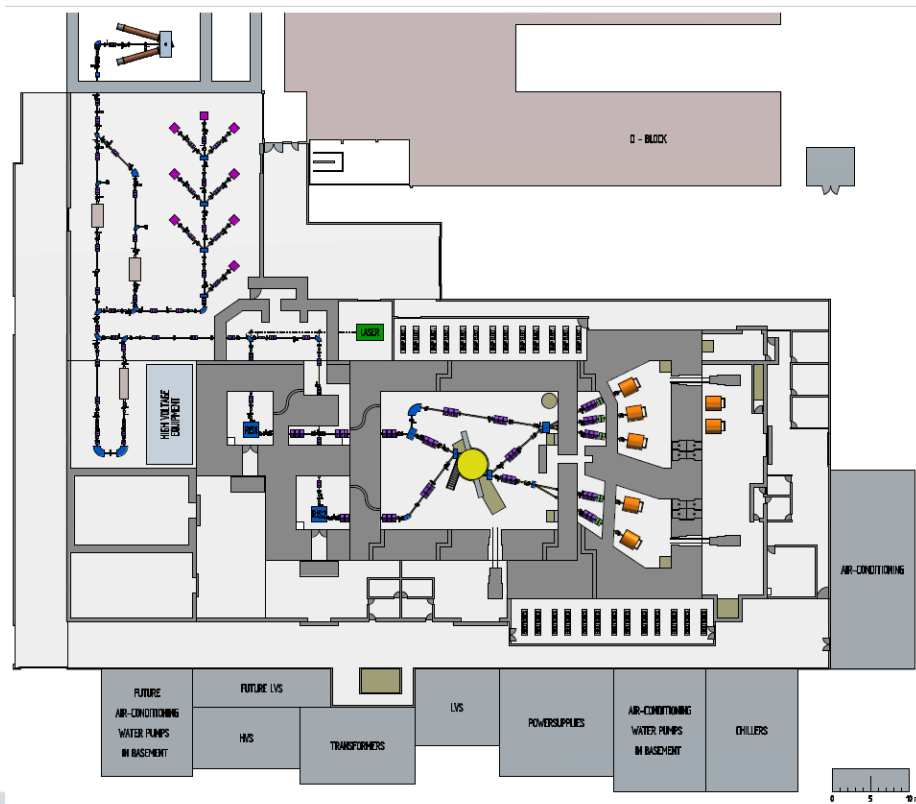
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Layout of the 70 MeV H-minus Cyclotron Facility

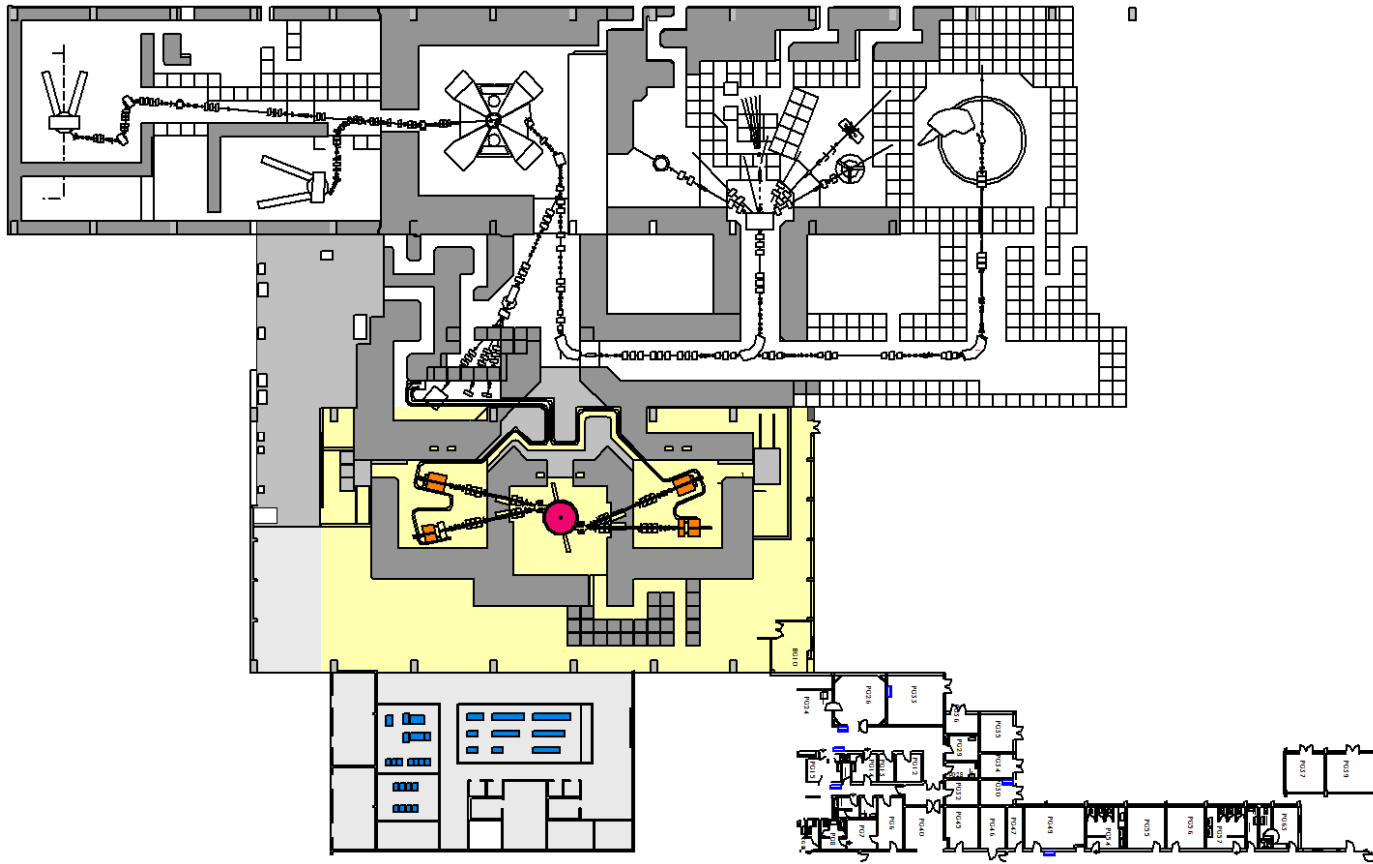


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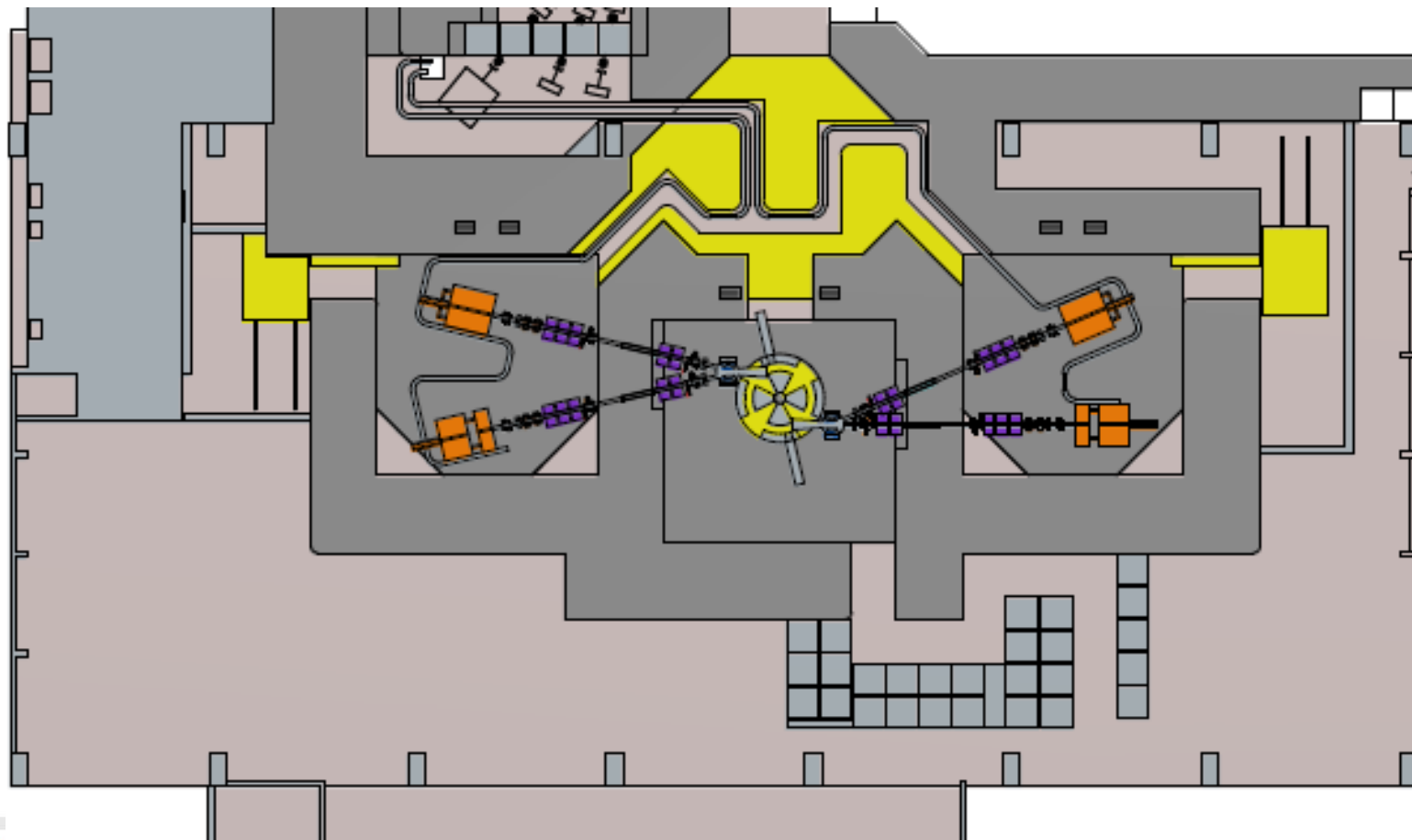
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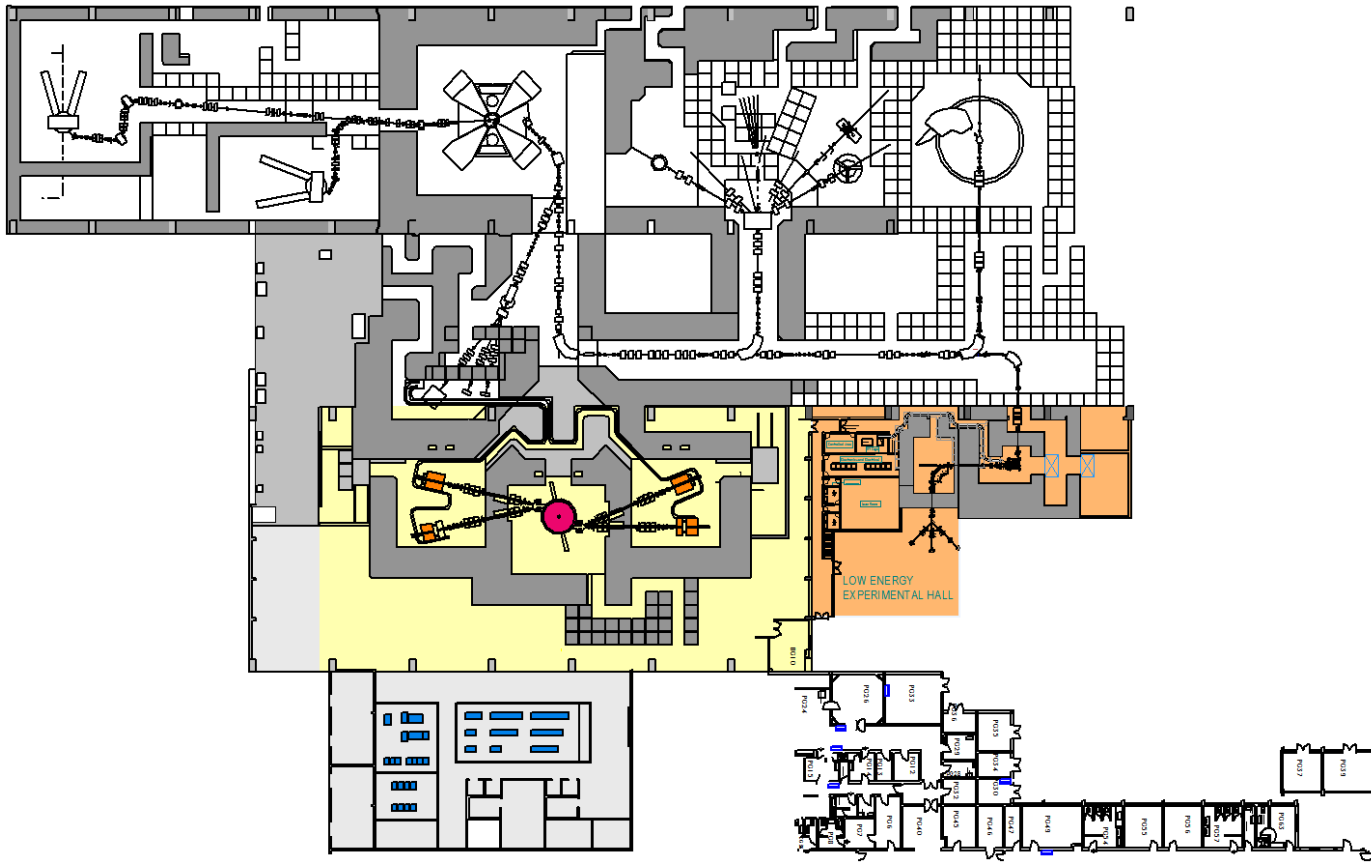
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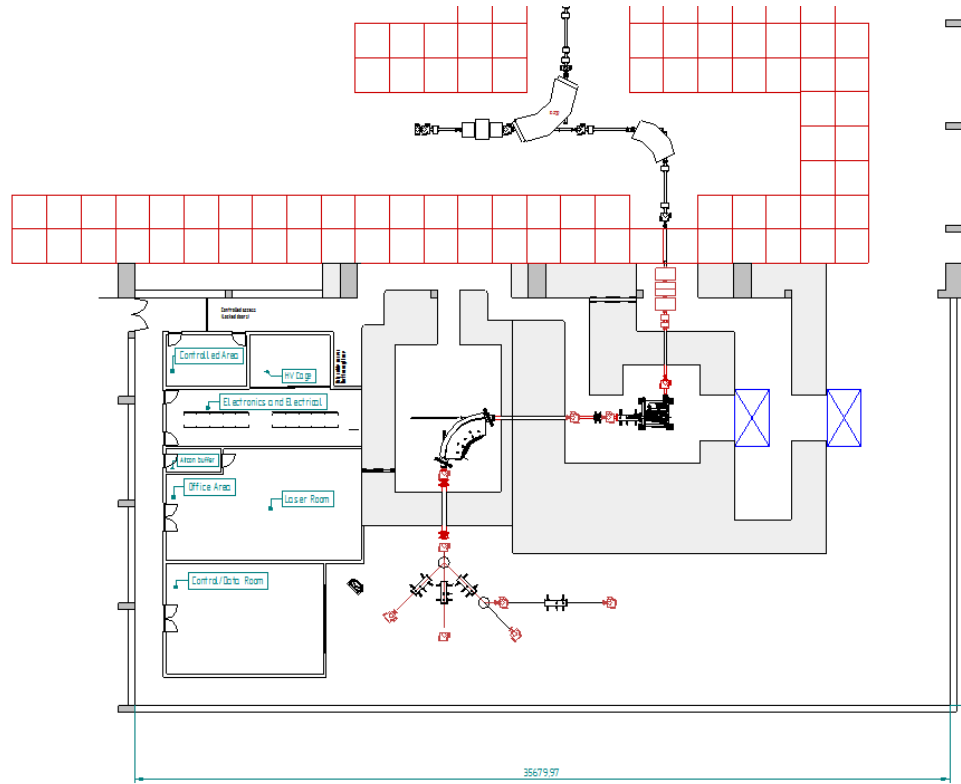
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Low Energy Rare Isotope Beamline (LERIB)



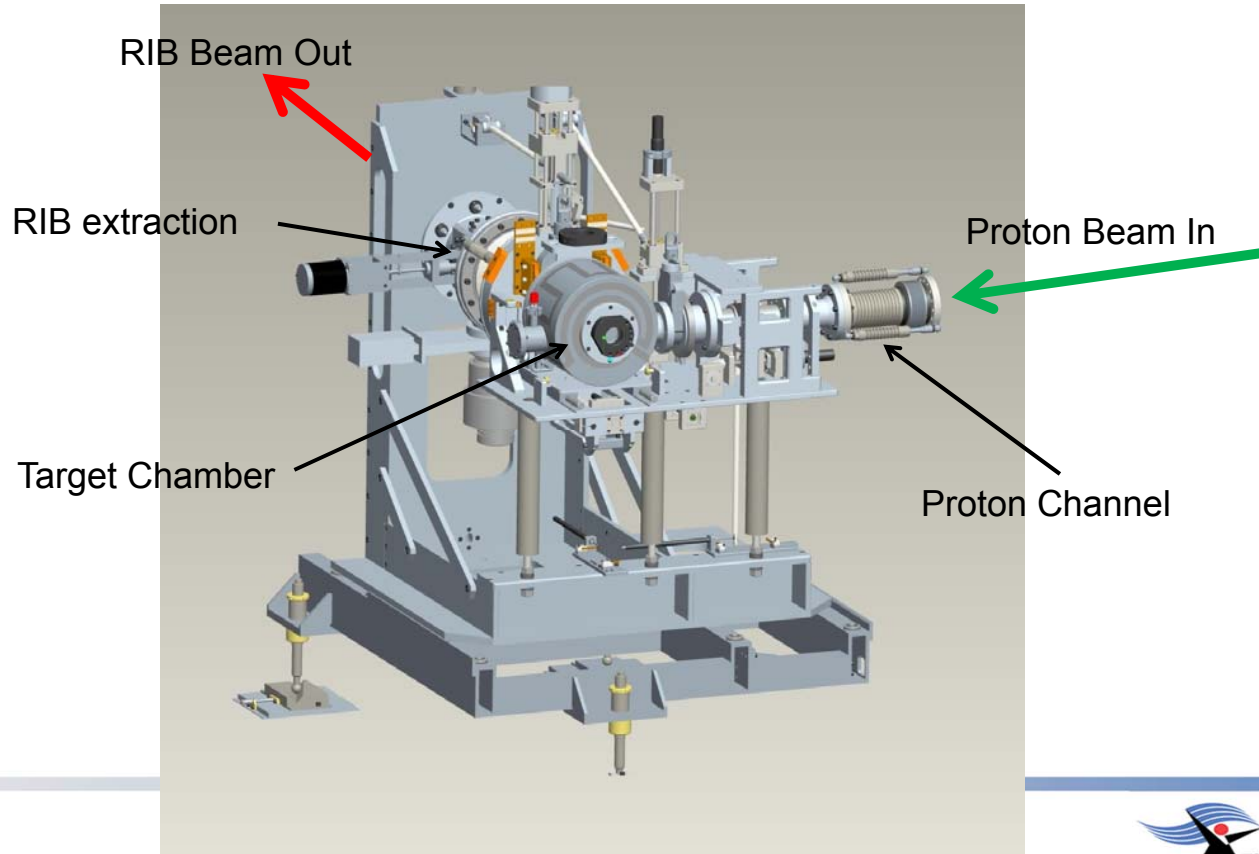
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RIB Target Ion Source



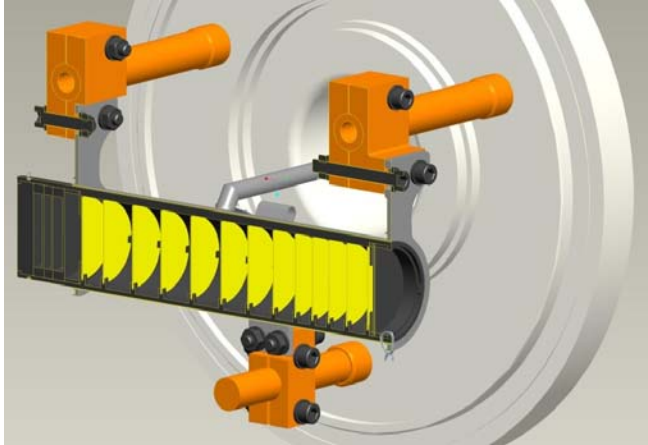
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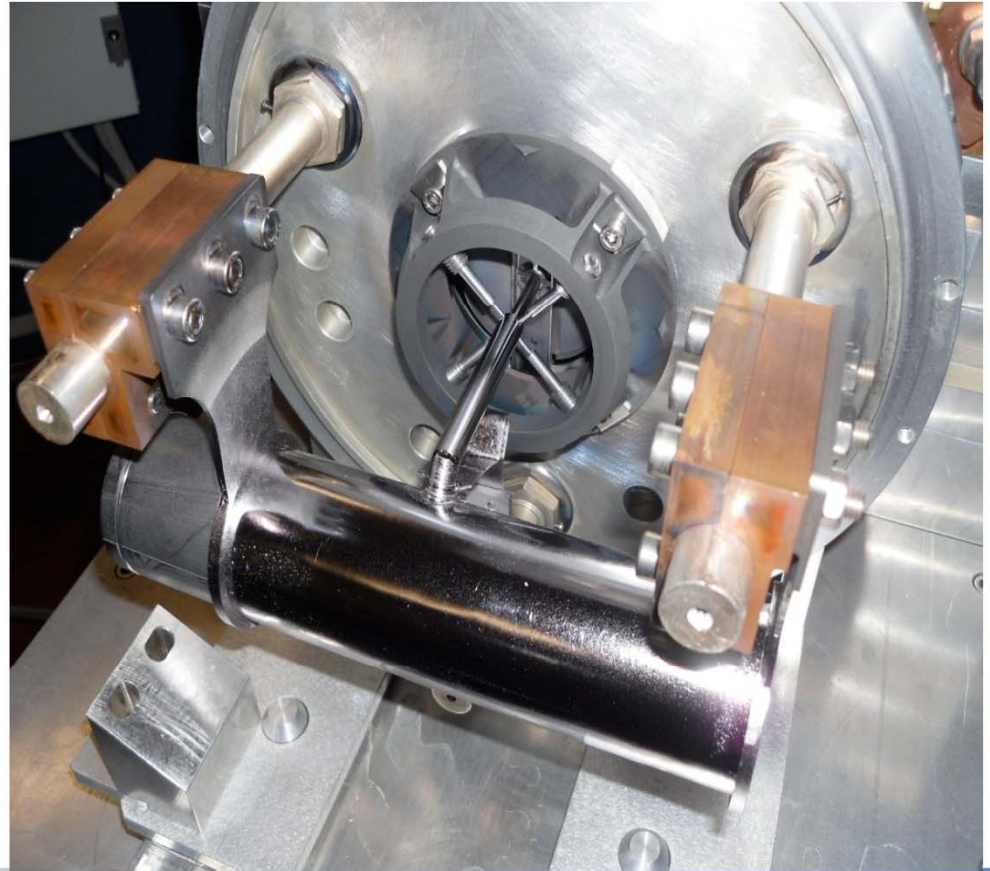
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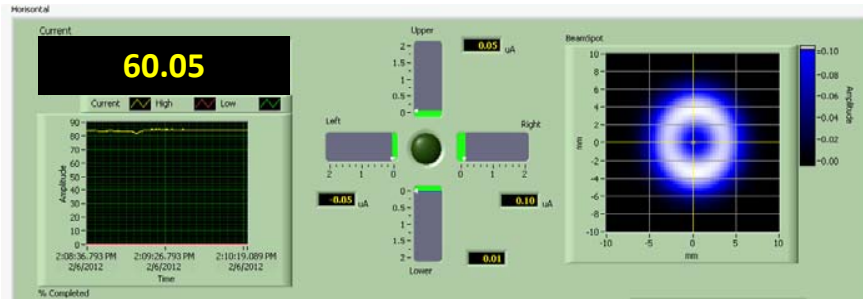
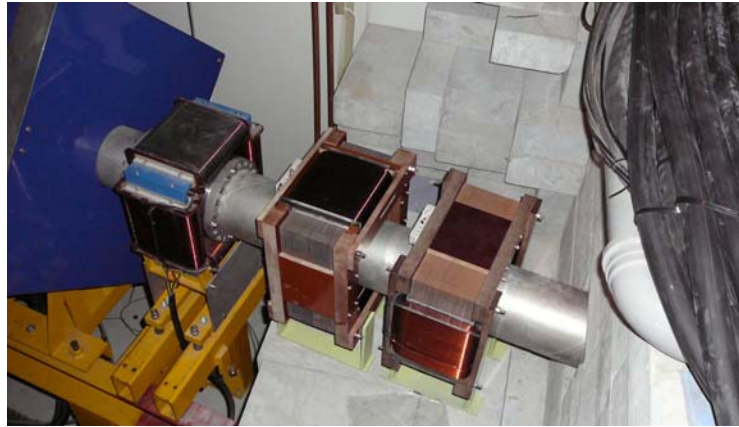
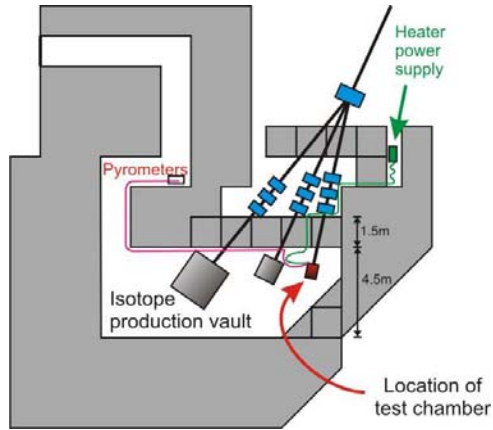


The SPES target (chamber lid removed), designed for a 70 MeV proton beam entering from the right. The heating current flows through the Ta tube, between the copper clamping bars at each end



CAD drawing of the SPES target assembly, showing the UC_x disks (yellow) in a graphite tube and also the beam dump disks (dark grey).





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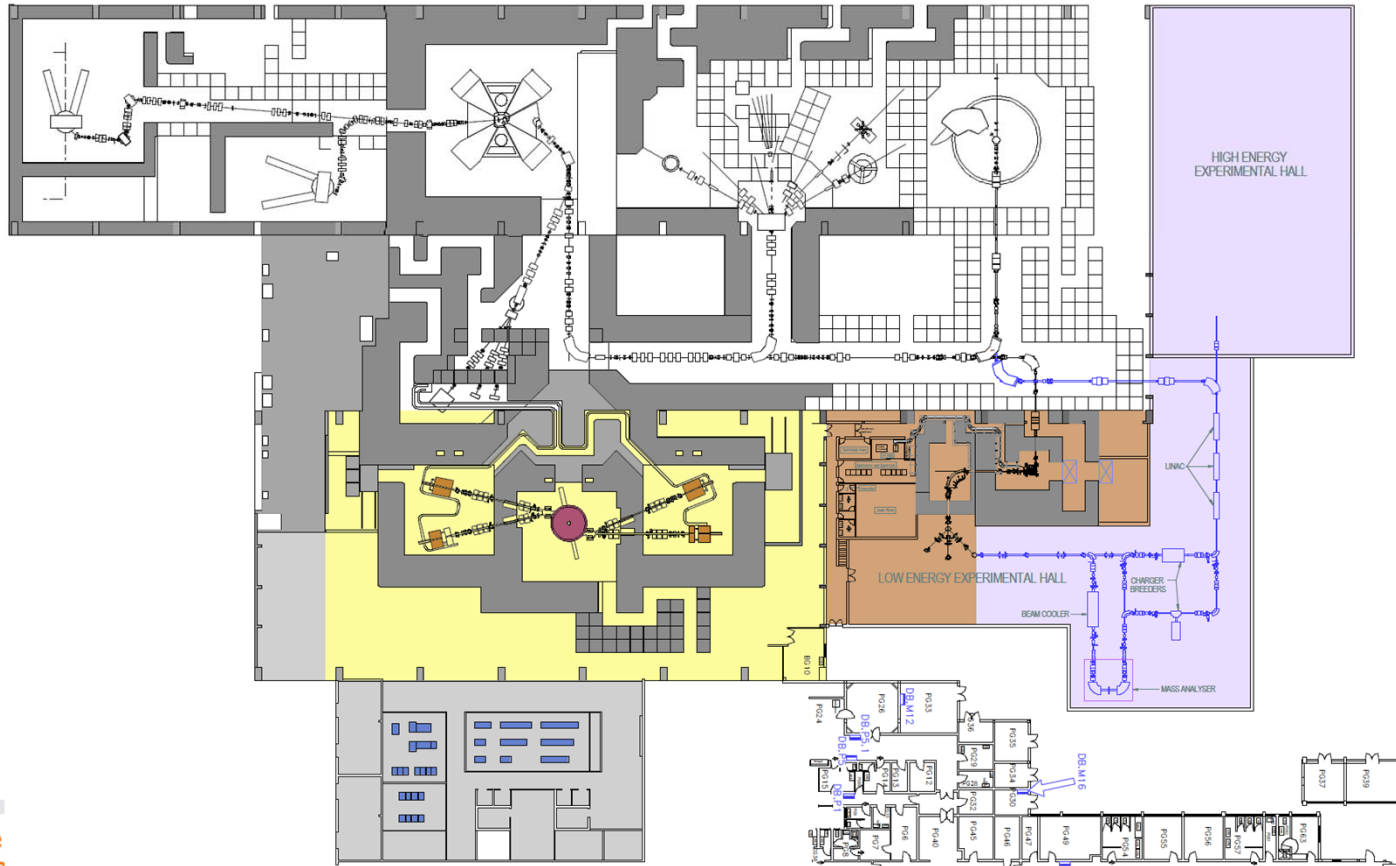
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New Facilities at iThemba LABS



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