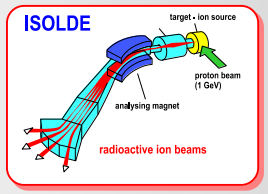


CATHI

Kick Off Meeting

Introduction

CERN, 23rd May 2011

Richard Catherall

EN-STI

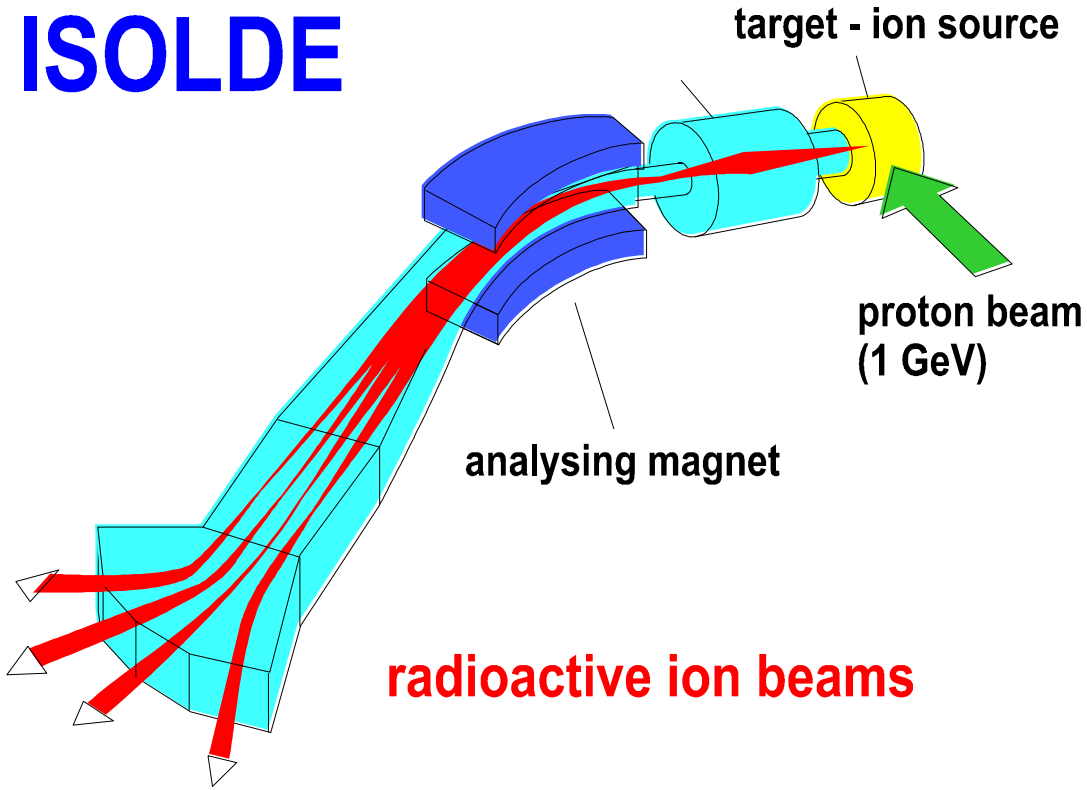
ISOLDE Technical Coordinator

Outline

- Welcome
- ISOLDE
- HIE-ISOLDE
  - High Energy Linac
  - Design Study
- CATHI and HIE-ISOLDE

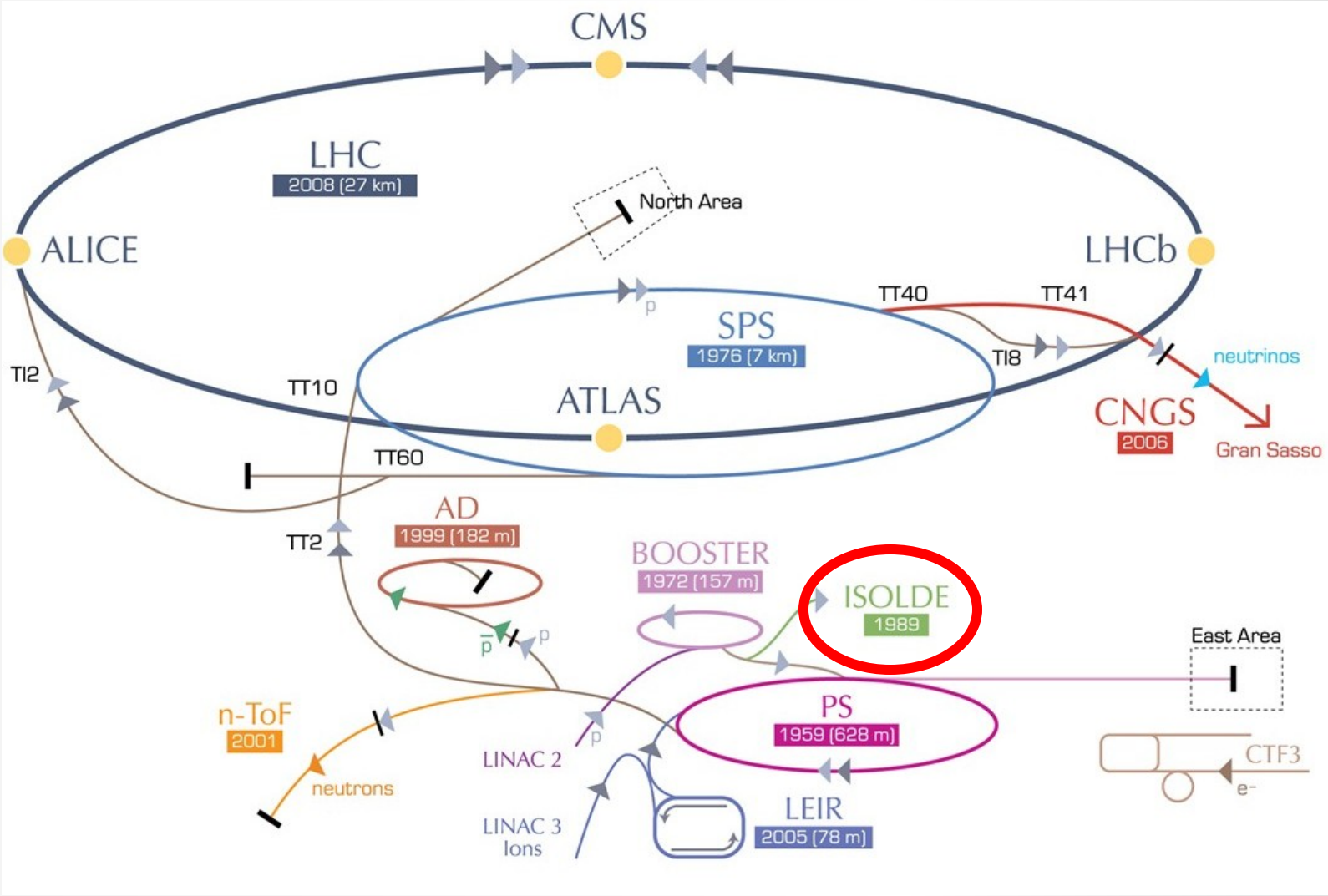
Welcome to CERN

ISOLDE

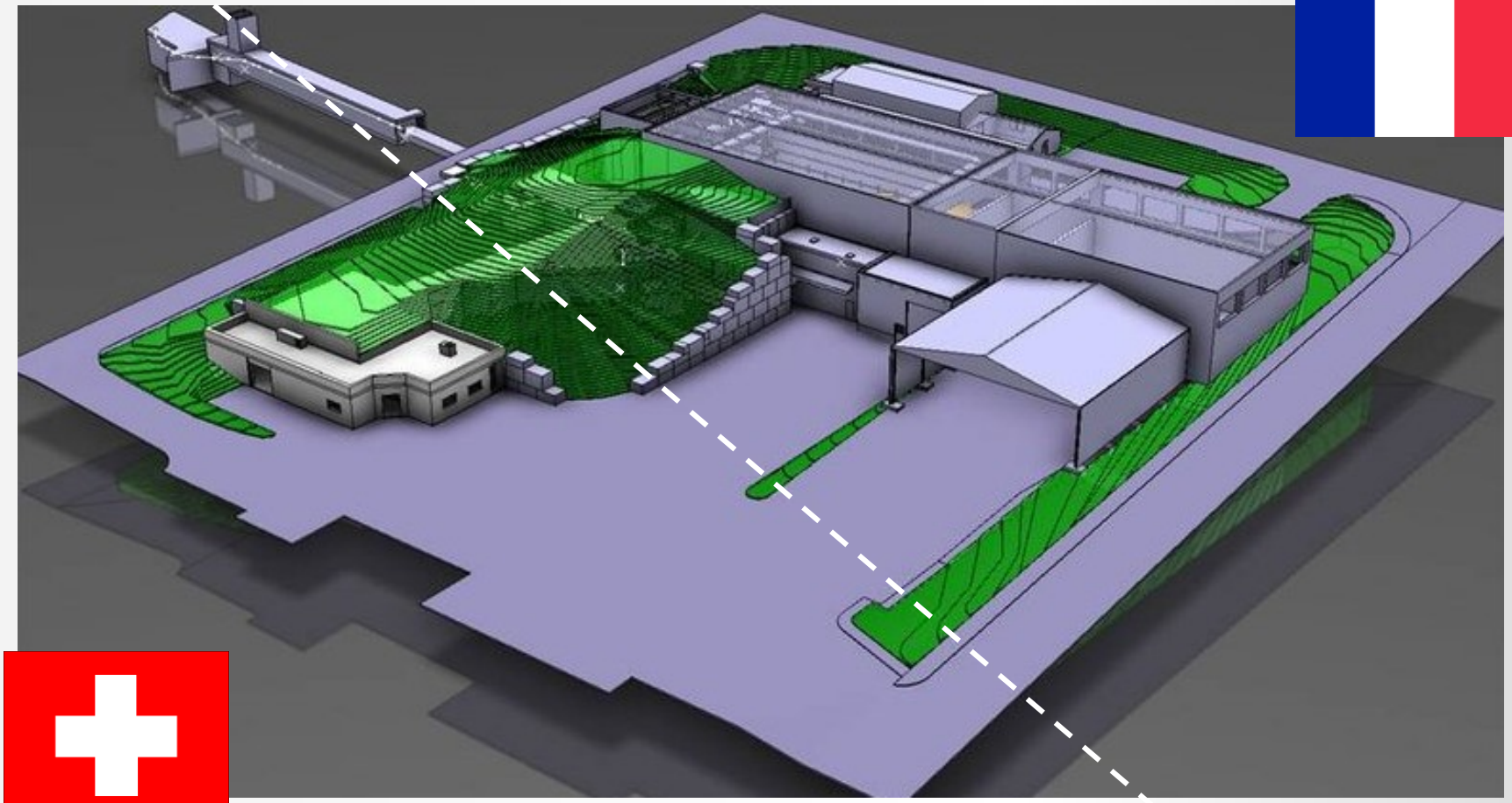


radioactive ion beams

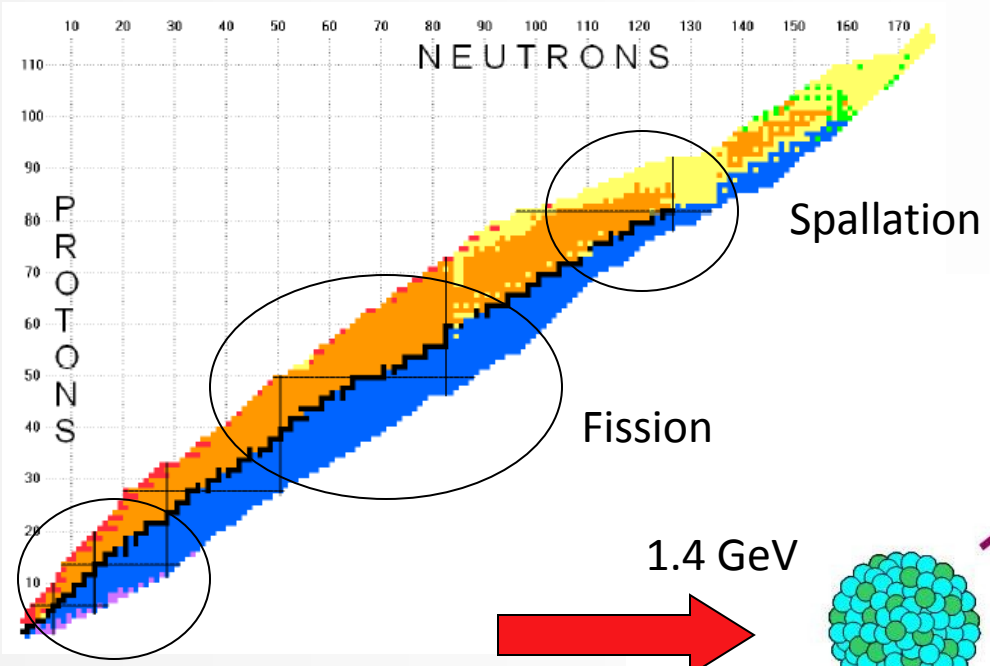
ISOLDE in the Accelerator Complex



But where is ISOLDE?

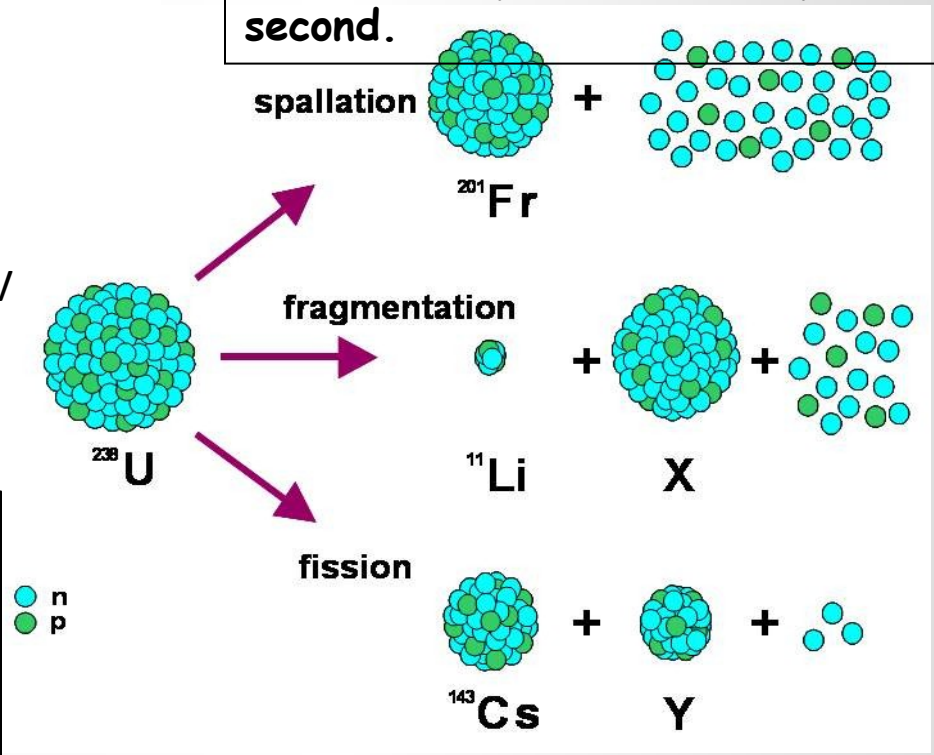


Isotope Separation On-Line



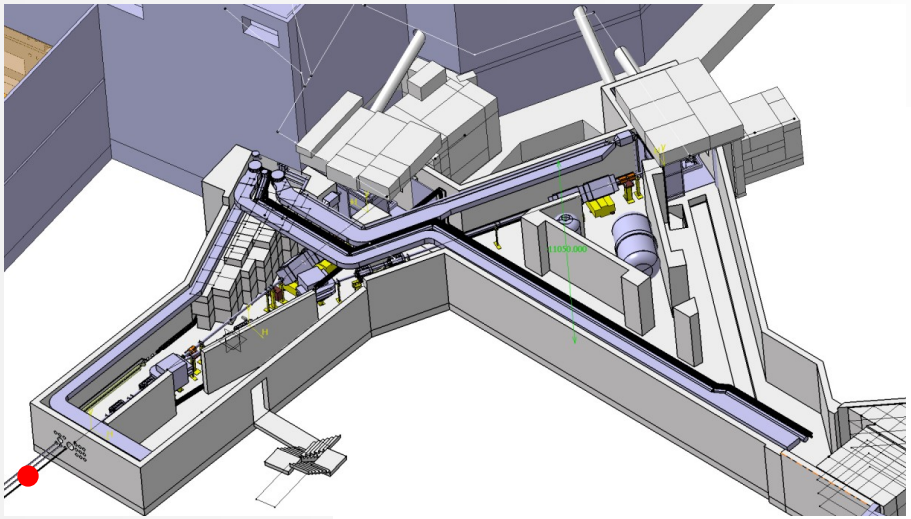
Up to 600 isotopes of more than 60 elements (Z=2 to 88) have been produced with half-lives down to milliseconds and intensities up to 10^{11} ions per second.

1.4 GeV



The On-Line Isotope Mass Separator ISOLDE is a facility dedicated to the production of a large variety of radioactive ion beams for a great number of different experiments, e.g. in the field of nuclear and atomic physics, solid-state physics, life sciences and material science.

The ISOLDE Facility



Up to 50% of available proton pulses are delivered to ISOLDE

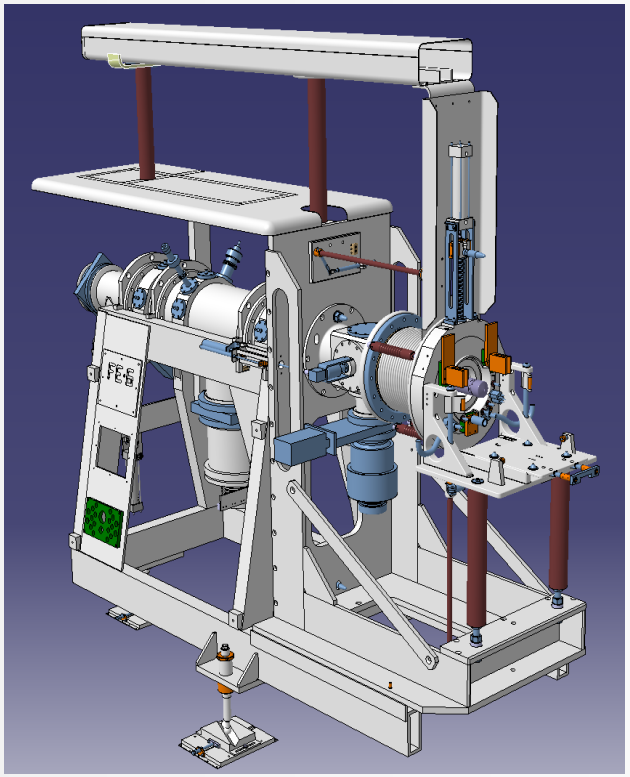
Class A labs

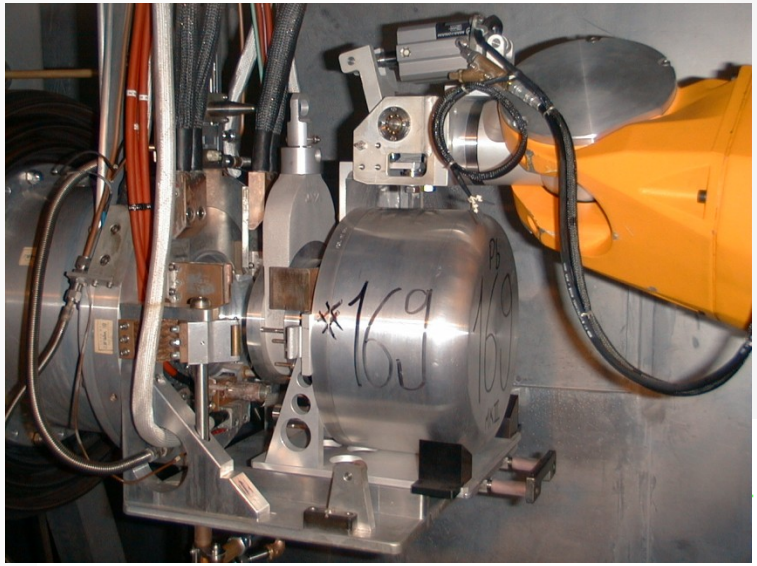
Target Area

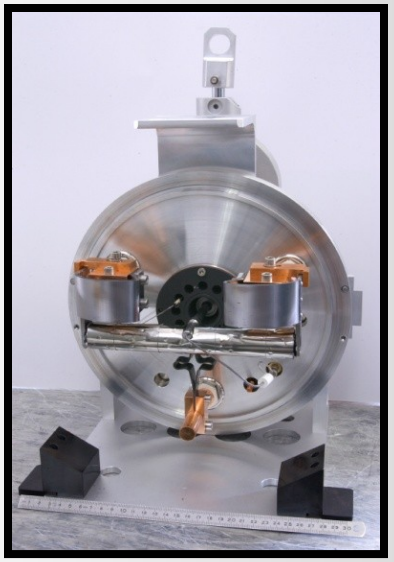
Experiment hall

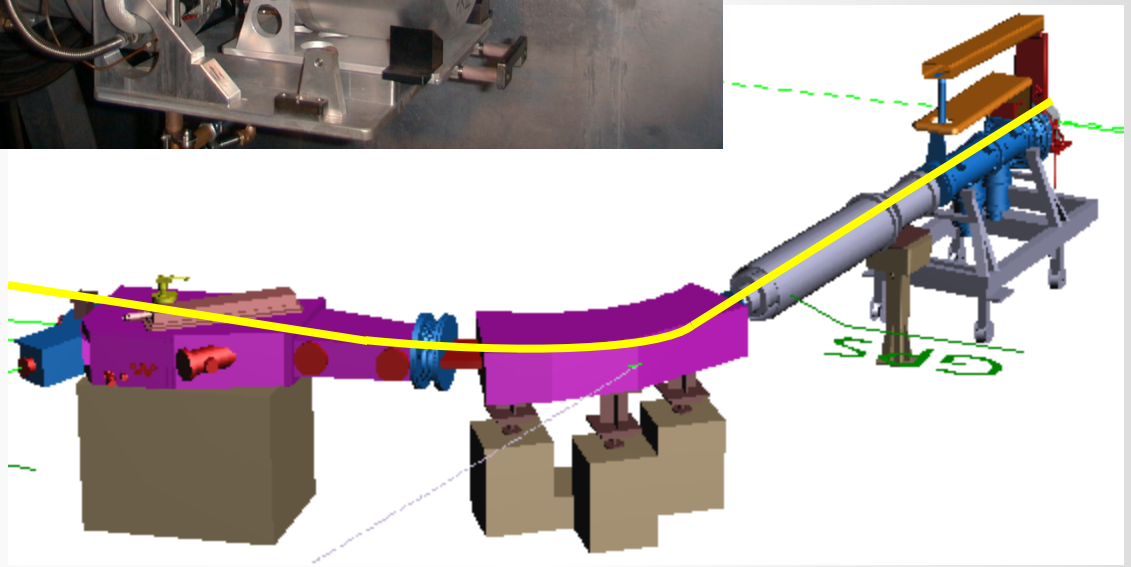
Ion Beam Production

Production of elements
Ionization
Acceleration to 60kV
Mass separation

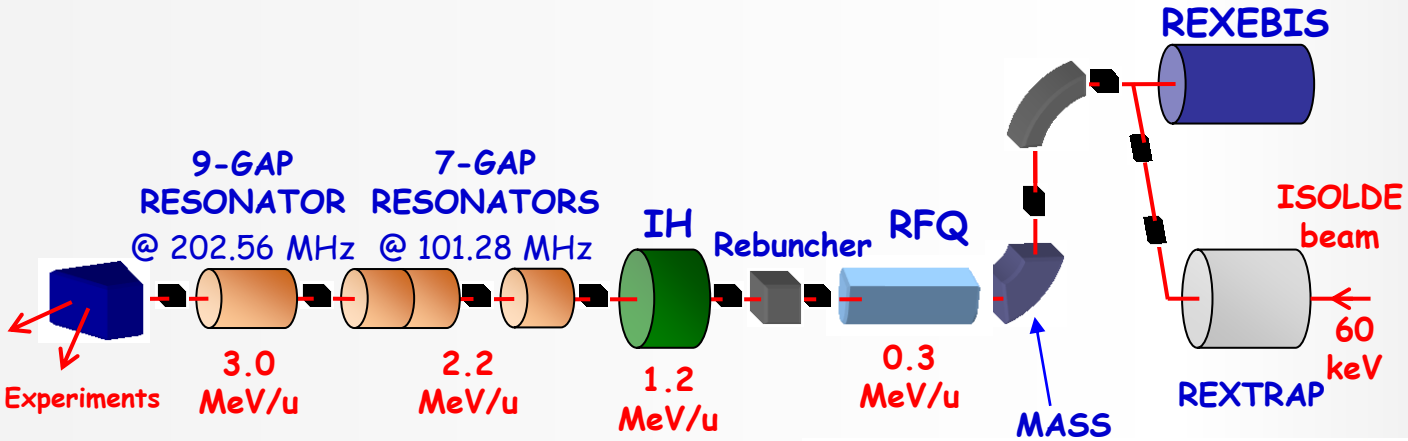




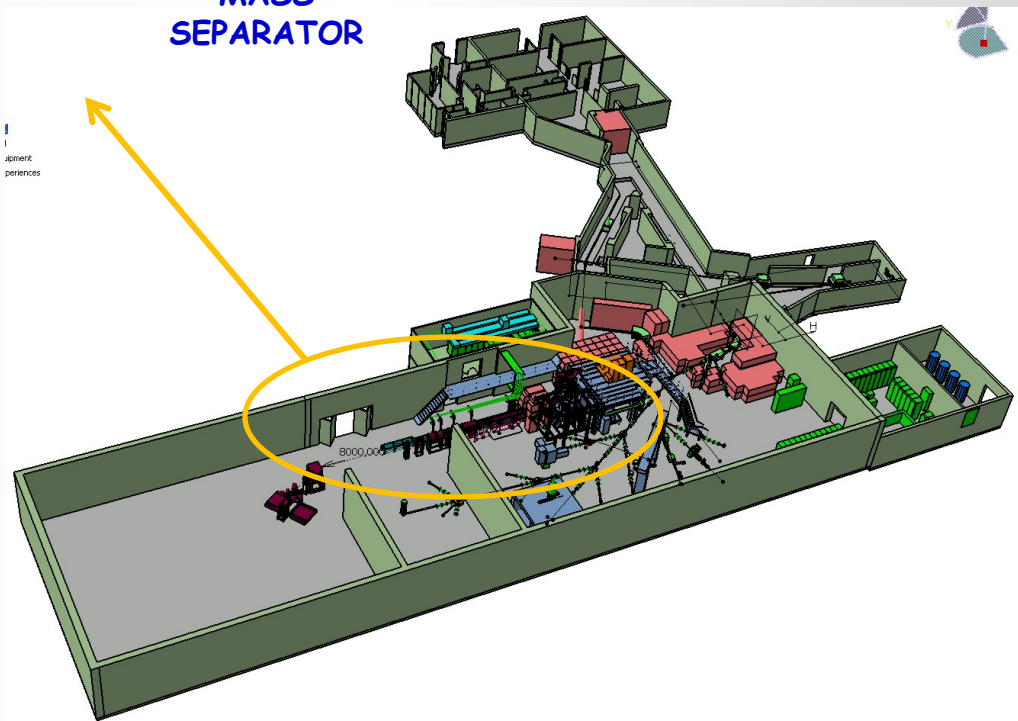




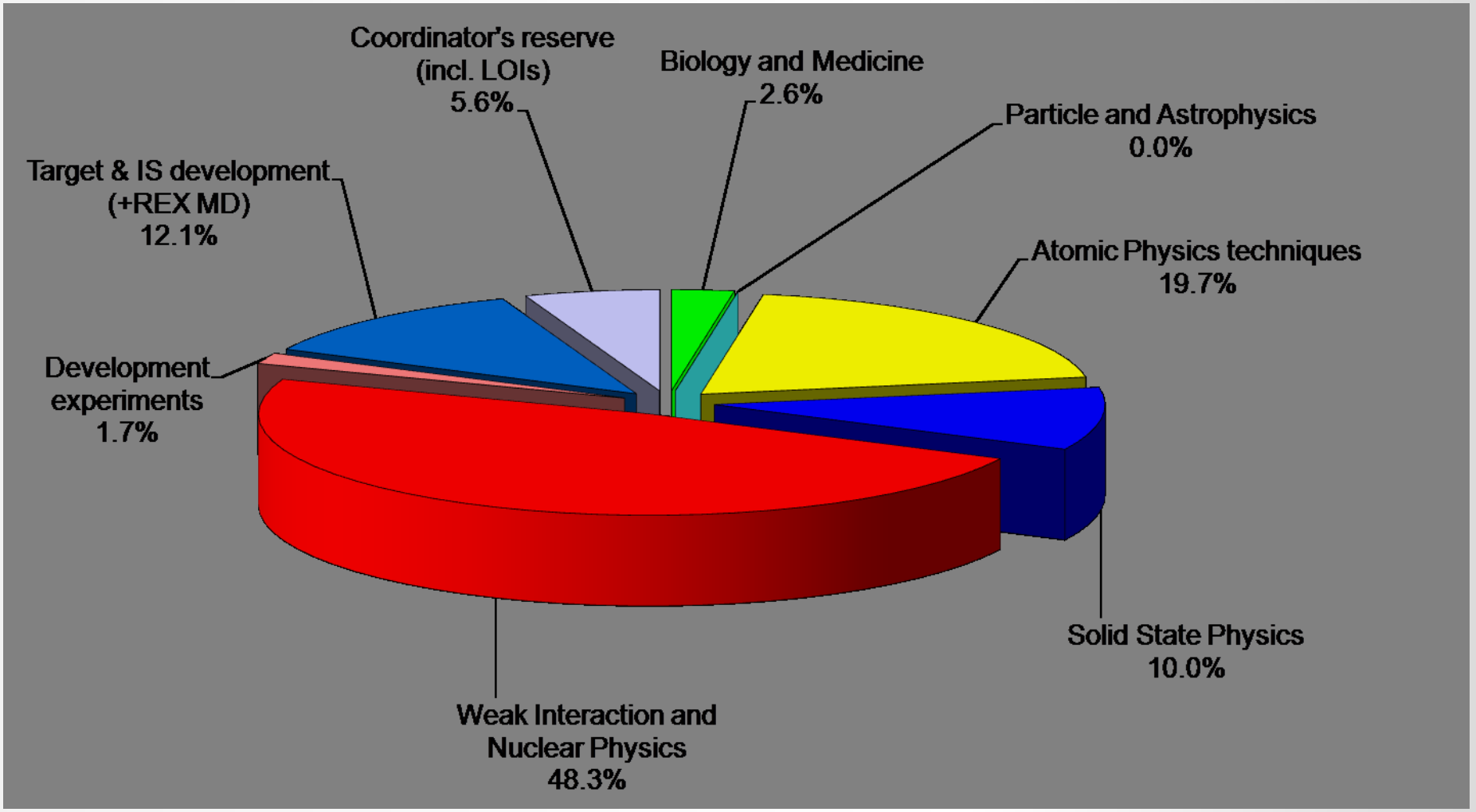
REX-ISOLDE



- REXTRAP
  - Penning Trap for beam cooling and bunching
- REXEBIS
  - Electron beam Ion Source for charge breeding
- Mass Separator
- Linac
  - Linear accelerator



Beam Time Distribution

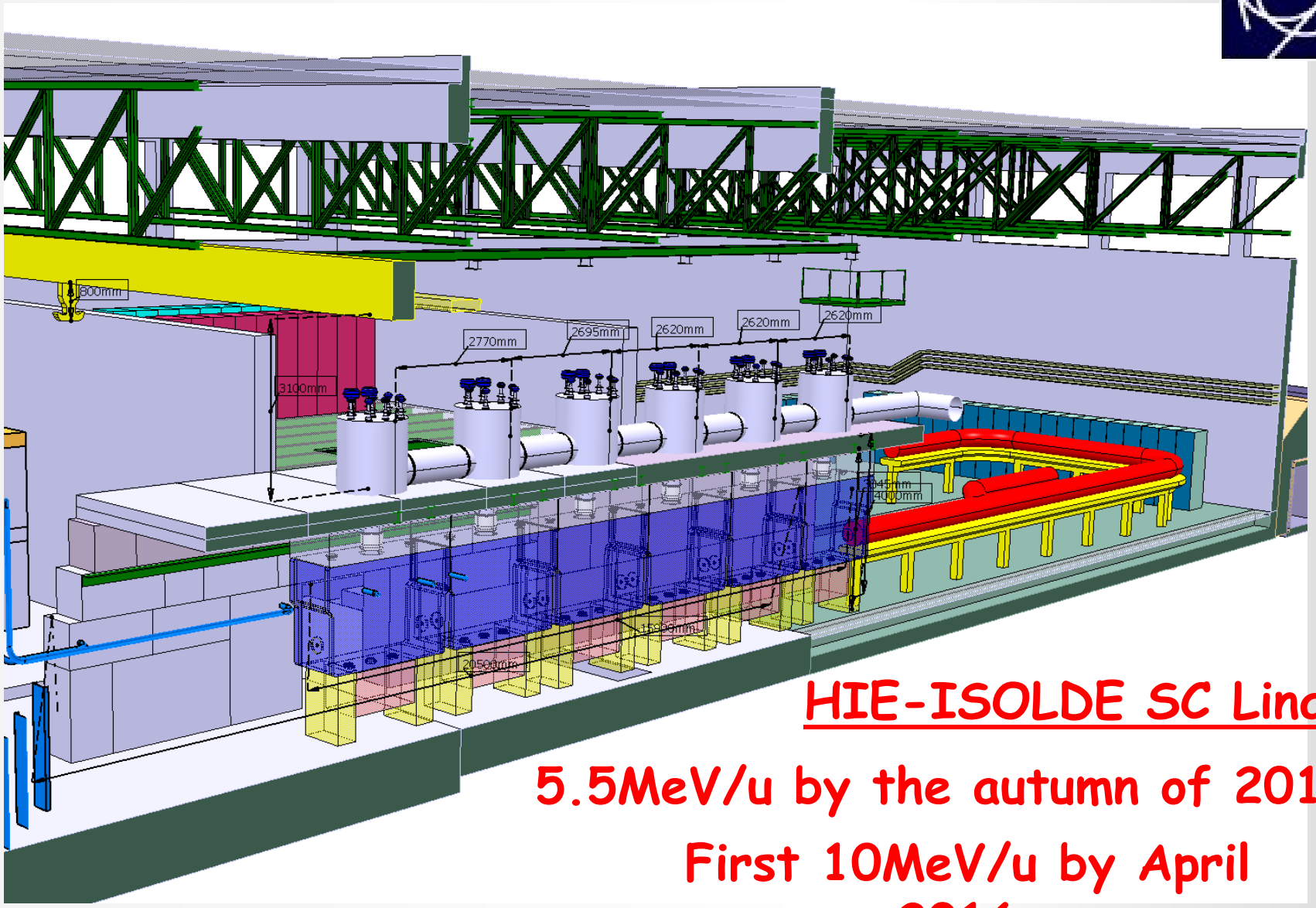



HIE-ISOLDE

HIE-ISOLDE Energy Upgrade

- Take advantage of the large variety of radioactive ion beams available at ISOLDE and increase the post acceleration energy to 10MeV/u to broaden the scope of physics experiments.
- Extension of REX-ISOLDE Linac with superconducting RF cavities.

HIE-ISOLDE SC Linac



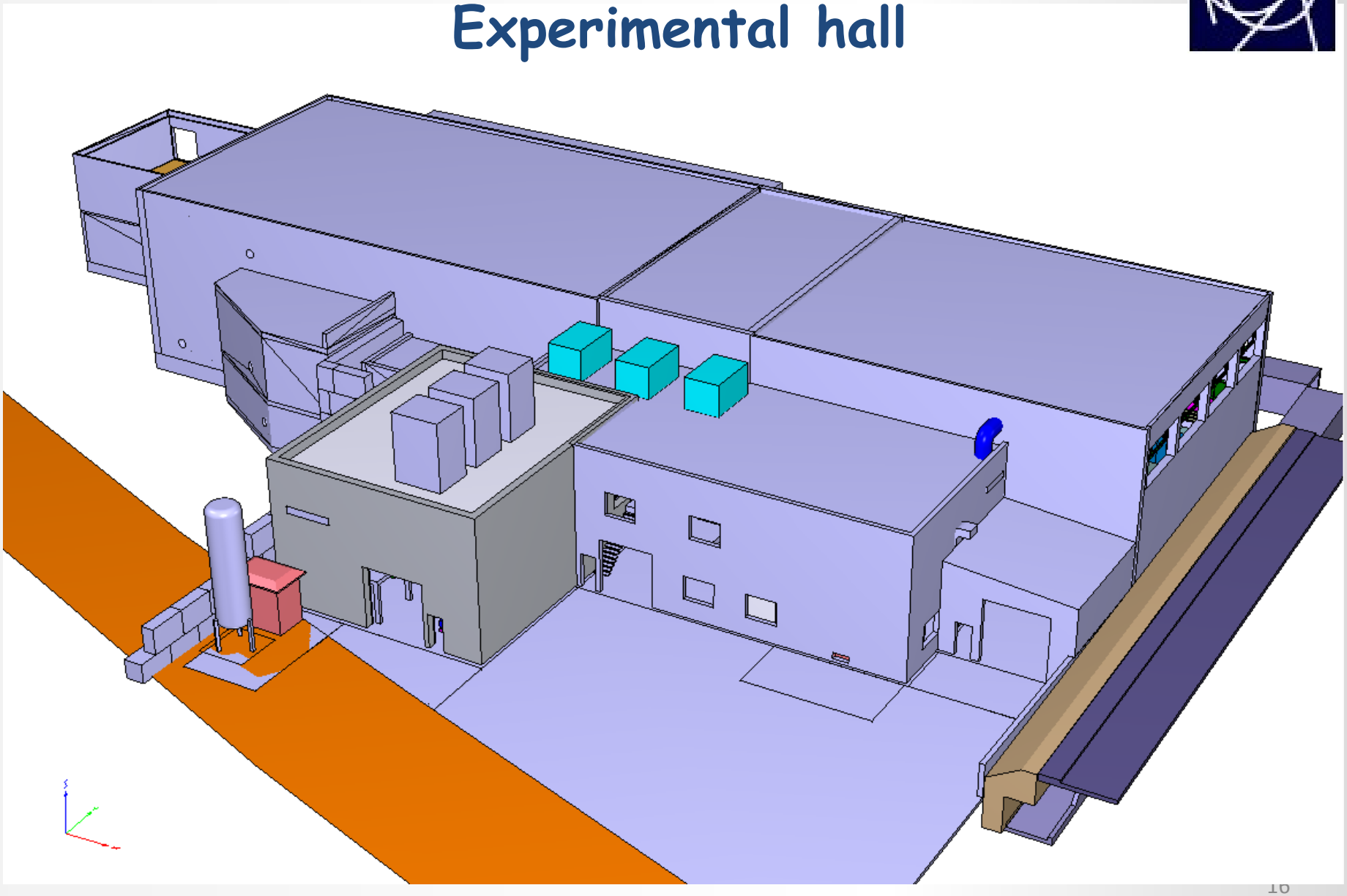
HIE-ISOLDE SC Linac:

5.5MeV/u by the autumn of 2014

First 10MeV/u by April 2016

HIE-ISOLDE

Experimental hall



HIE-ISOLDE Design Study

- Address the consequences of an increase in primary beam power following the commissioning of Linac 4 and possible future modifications of p-beam parameters.
- Outline the needs for an upgrade of secondary beam quality

Intensity (p/p)	Intensity (uA)	Energy (GeV)	Cycle (s)	Power (kW)
3×10^{13}	2	1.4	1.2	2.8
6×10^{13}	4	1.4	1.2	5.6
6×10^{13}	5.3	1.4	0.9	7.5
6×10^{13}	4	2	1.2	8
6×10^{13}	5.3	2	0.9	10.7

Design Study

Intensity Upgrade

- Ventilation issues
- Vacuum issues
- Targets
  - Fluka simulations
  - Target design
  - Materials
- Front End
  - Mechanics
  - Optics
- HV systems

Beam Quality Upgrade

- High resolution magnet
- RFQ Cooler
- REXEBIS upgrade
- Off-line separator
- Pre-mass separator

Through previous experiences and collaborations, identify the issues associated with the existing facilities.

Extrapolate these issues as a function of proton intensity increase and secondary beam requirements.

Address the issues and provide acceptable solutions in the form of conceptual designs and reports.

Assess the implications of any modifications in terms of resources, infrastructure and planning.

Identify priorities and plan their implementation as a function of overall schedule and the existing facility

Deliverable – Final Design Study Report

CA HE-ISOLDE

CATHI and HIE-ISOLDE

- CATHI – Cryogenics, Accelerators and Targets at HIE-ISOLDE.
- The HIE-ISOLDE project at CERN is an ideal R & D opportunity to train young engineers over a range of disciplines relevant to the accelerator and nuclear industry.
- CERN and the associated partners of CATHI can provide excellent hands-on and academic training.
- ISOLDE provides a multi-disciplinary environment on a scale that encourages collaboration and teamwork.

	Discipline	ESR	ER
High Energy Linac	Cavity and cryomodule tests	ESR2	
	Beam Instrumentation	ESR3	ER2
	Magnet Design	ESR4	
	Low level RF		ER1
	Cavity fabrication and surface treatment	ESR1	
	Integration	ESR5	
	Alignment and Control	ESR6	
	Operations software programming	ESR7	
Design Study	Target material studies	ESR8	
	Target conceptual design	ESR9/10	
	Extraction optics and Front end	ESR11	
	Low level controls	ESR12	
	Cooling and ventilation	ESR13	
	Vacuum development	ESR14	
	Off line separator and HRS magnet	ESR15	
	RFQ cooler and pre-separator	ESR16	
	Upgrade of REXEBIS		ER3
Safety	Radiation Protection		ER4