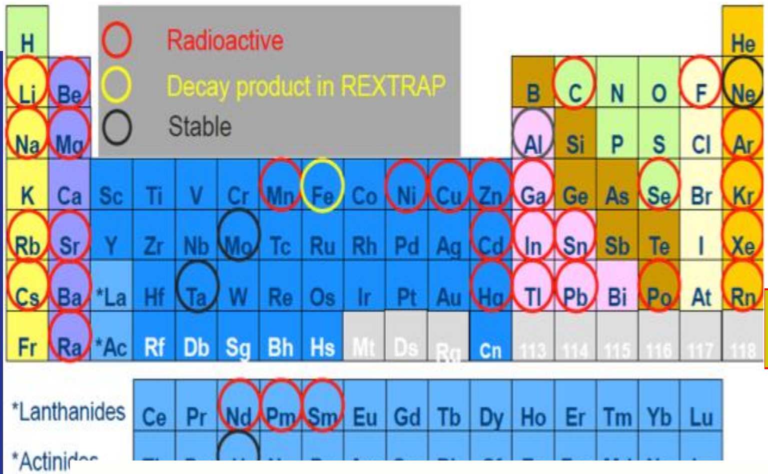
Post-accelerator: REX-ISOLDE

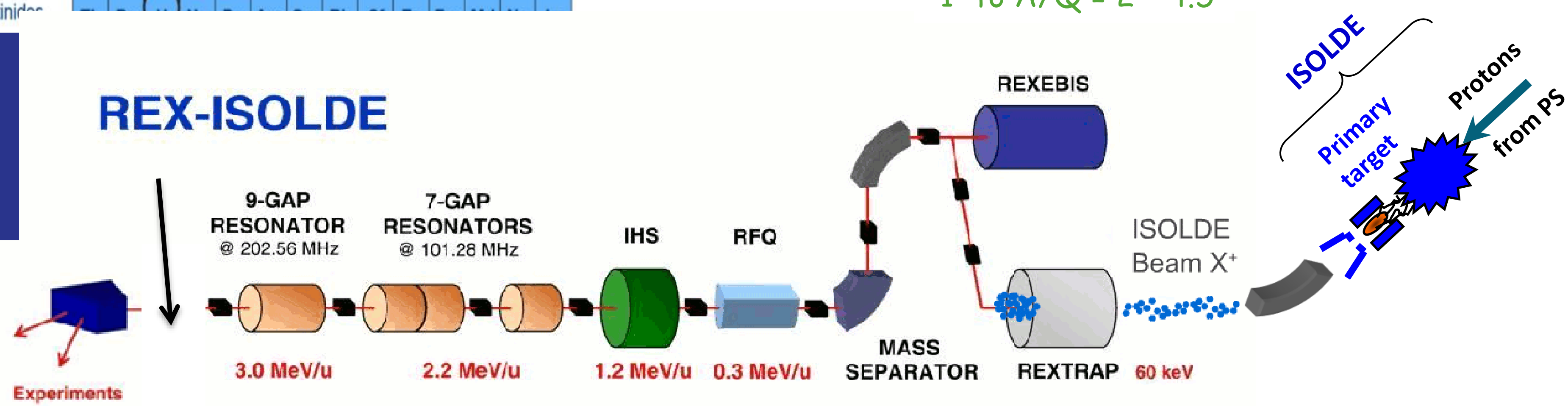


REX-ISOLDE started in 2001

> 100 different beams

Total efficiency : 1 -10 %

1^{+} to A/Q = 2 - 4.5



* 6 cavities
* 100 and 200 MHz, ~100 kW
* 300 keV/u to 3 MeV/u

The charge breeding time depends on A/q
→T = 20 ms for (A<40) to over
T> 200 ms A <200
Duty cycle 10 % duty cycle.

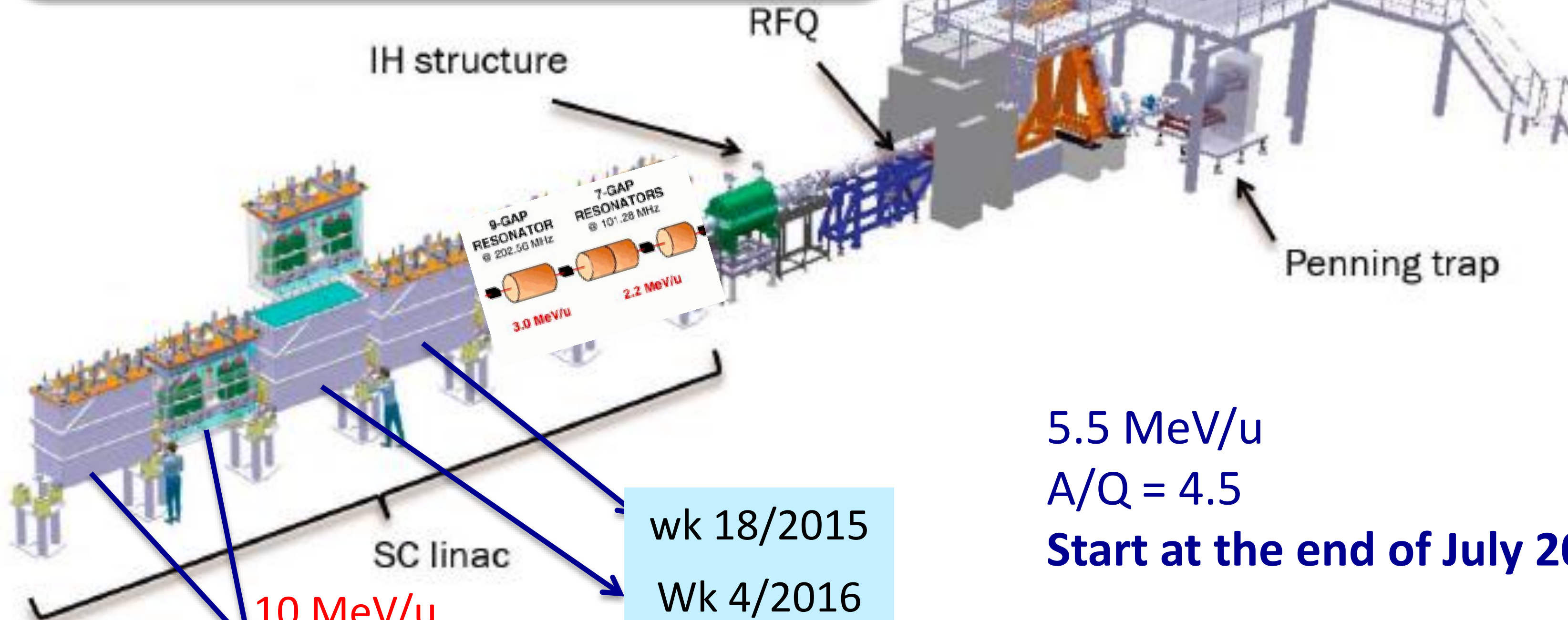
High Energy Increase HIE-ISOLDE

Increase in Energy to 10 MeV/u:

4 x cryo-modulesof high-β

20 Nb-on-Cu QWRs

4 cooled soleniod



wk 18/2015

Wk 4/2016

5.5 MeV/u

A/Q = 4.5

Start at the end of July 2016

10 MeV/u

A/Q = 4.5

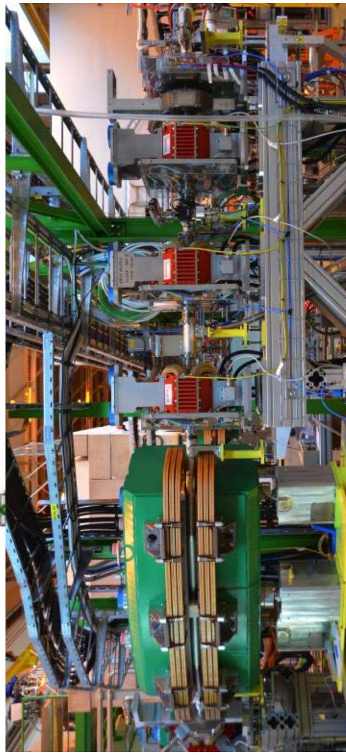
Installed at a rate of 1 cryomodule / year

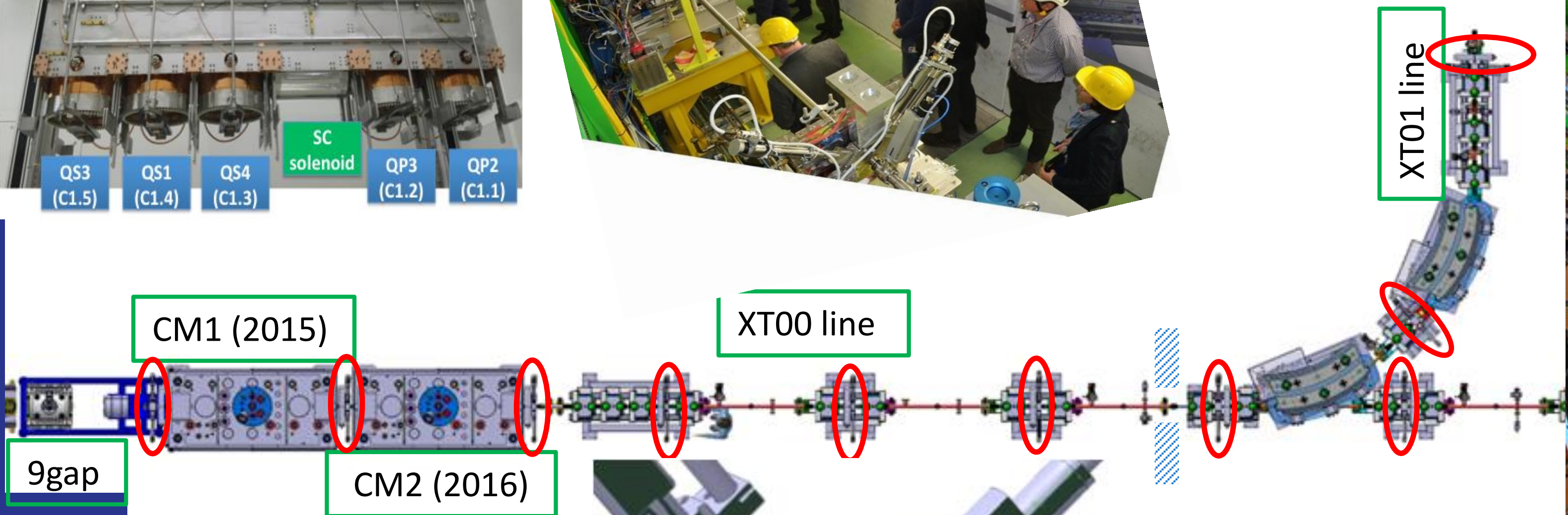
The Super Conducting Linac

27th of May DG
Visit to ISOLDE

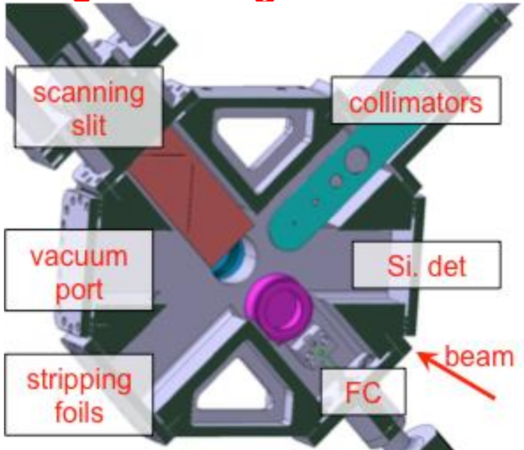
Used for Physics

Tested





Diagnostic boxes



Linac: Short DBs (5).

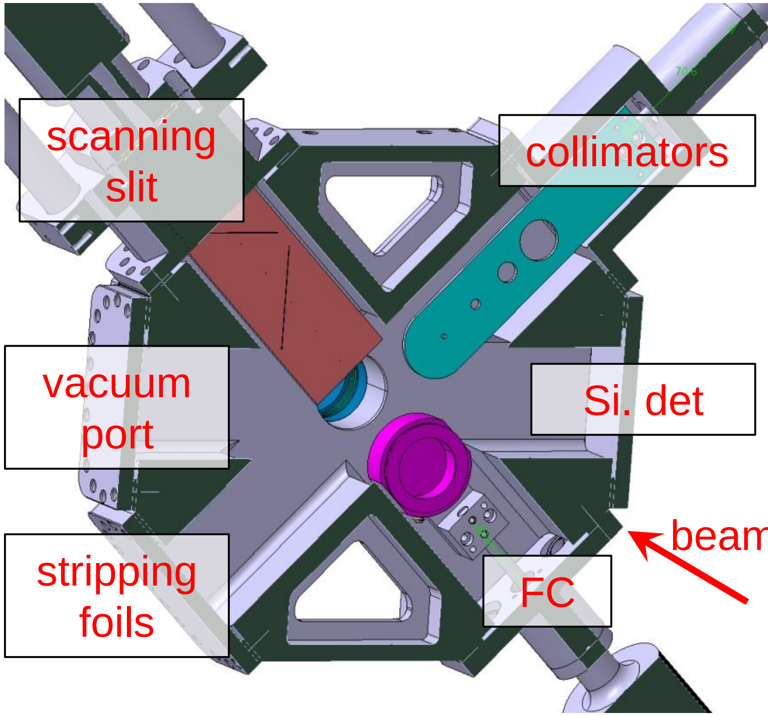
HEBT: Long DBs (8).

Short and Long diagnostic boxes

Due to tight space constraints in the longitudinal direction, two designs for the DBs were implemented:
Linac: Short DBs (5).
HEBT: Long DBs (8).

The functionality and operation of the instruments is similar in the SDBs and LDBs. The only difference between them is that the SDBs have a compact Faraday cup.

Depending on which devices are included on each DB, there can be up to 4 different types/configurations of DBs.



Isotopic Beam Identification box

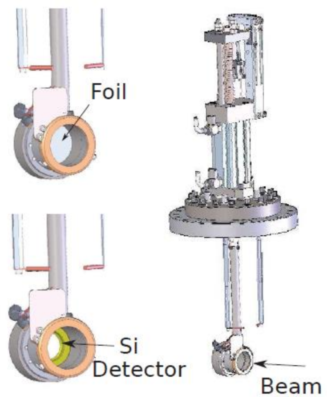
Jose Alberto Rodriguez, BE-OP-PSB (x167538)

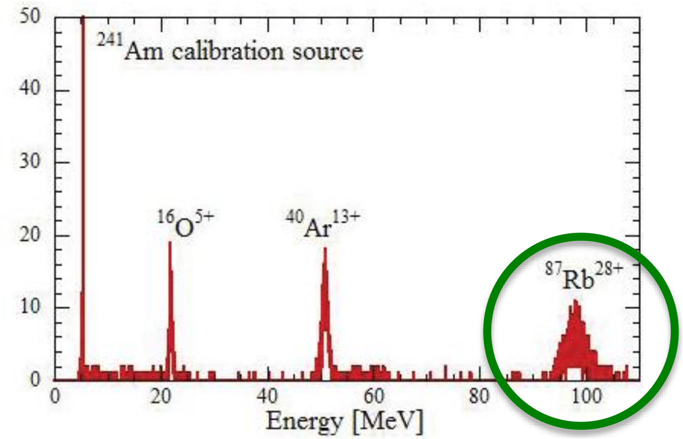
O. Tengblad
E. Nácher

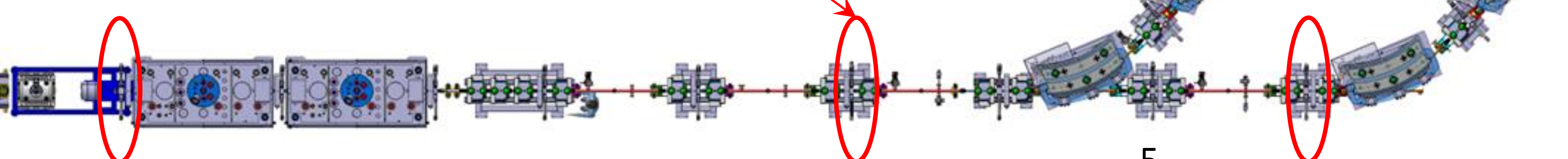
Uses in their current configuration:

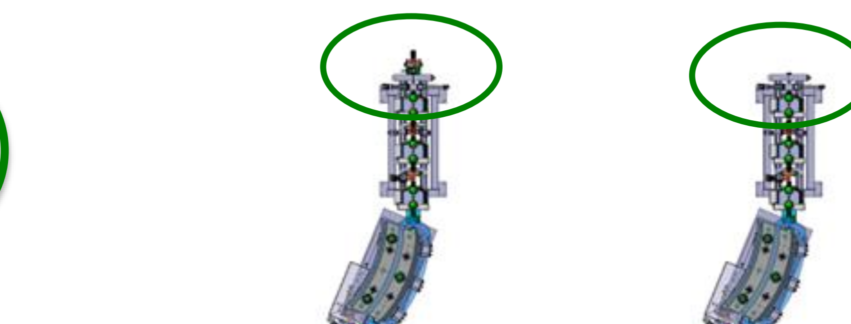
- Relative energy measurements
- Phasing of RF cavities
- Absolute energy measurements
  Time of flight measurements
- Identify contaminants in the beam

Isotopic Beam Composition Delivered to Experiment







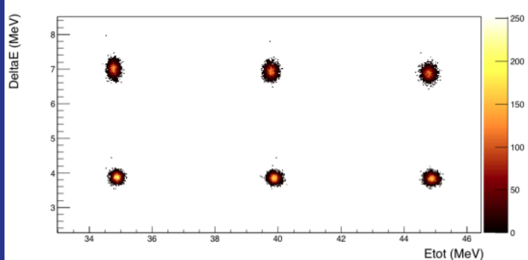


Simulation study of a silicon telescope for ion identification @ HIE-ISOLDE

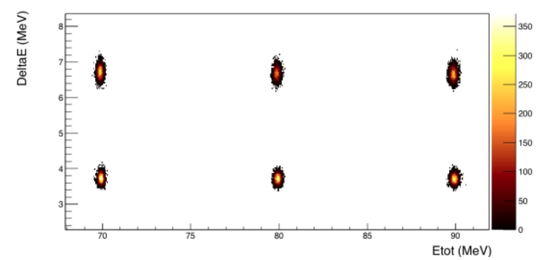
Detection system: Telescopes of different thickness simulated
Intrinsic resolution of the detectors: FWHM (keV) 9 keV sqrt(E) to fulfill 20 keV at 5 MeV

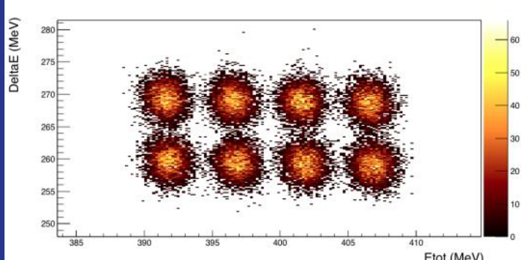
Beam:
Ion beams of Li, Be, Mg, Al, Kr, Rb, Cs and Ba of different masses.
Energy profile: gaussian with mean 5 (10) AMeV and sigma 0.2% of the nominal energy.
Beam spot: 2 mm diameter, perpendicular to the detector. 4e3 events simulated

Beam Energy: 5 MeV/u	ΔE 30 μm E 600 μm	ΔE 50 μm E 800 μm	10 MeV/u Beam Energy

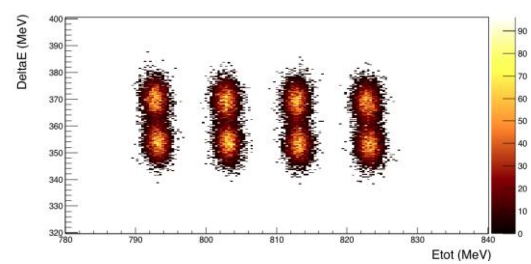


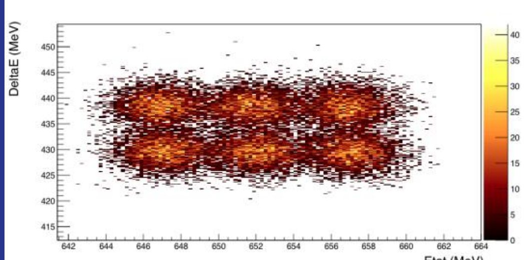
7-9Li
7-9Be



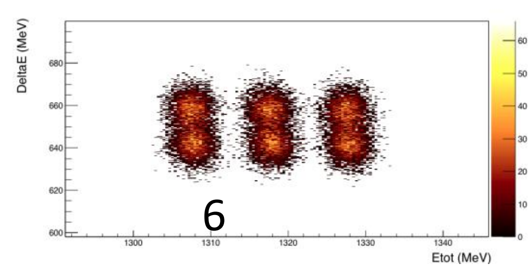


80-83Kr
80-83Rb

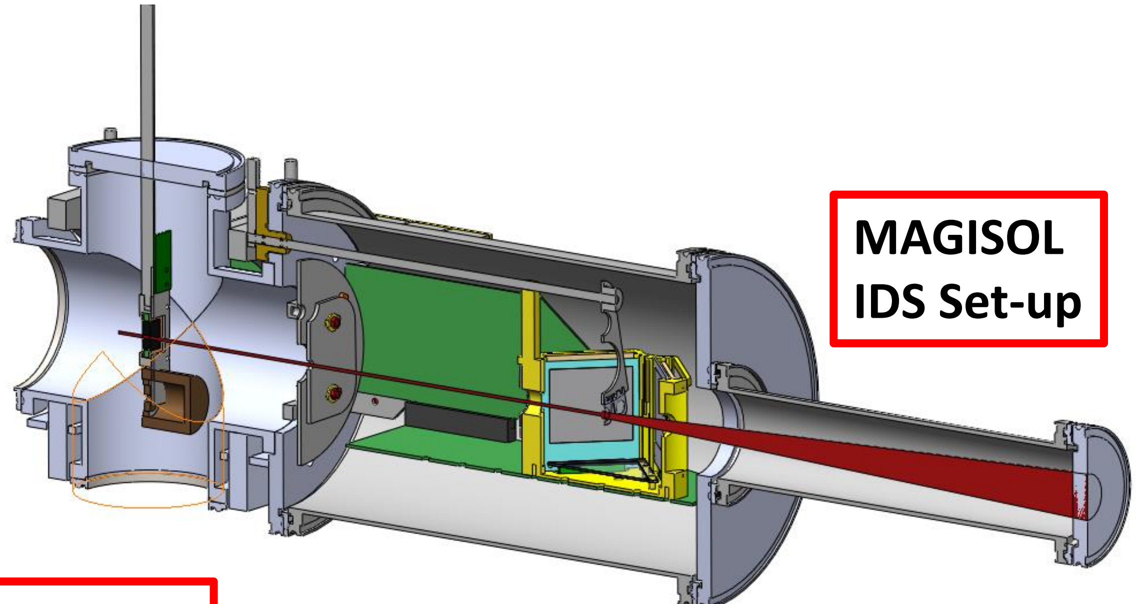


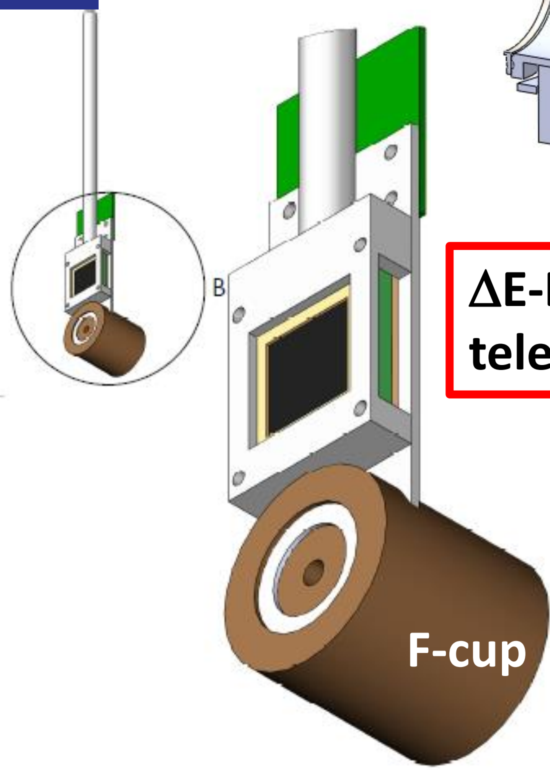


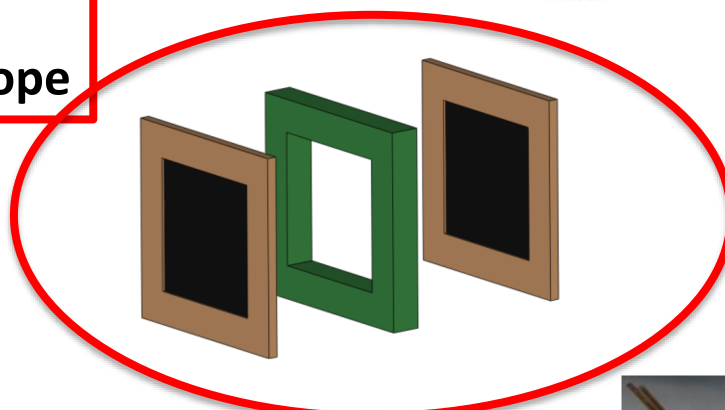
132-134Cs
132-134Ba



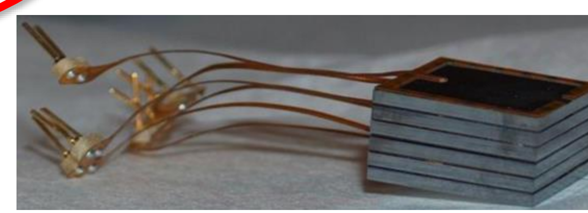
Test done in XT02 19th Nov 2015



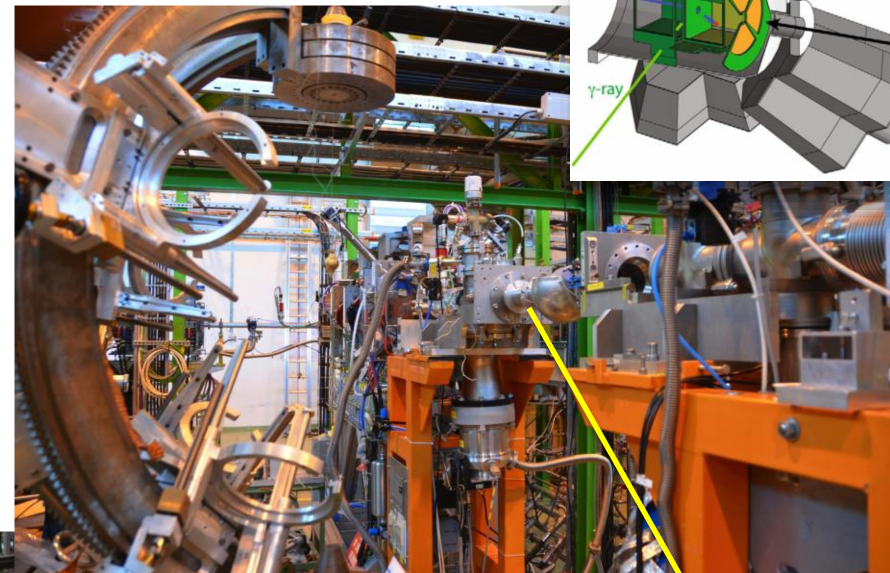


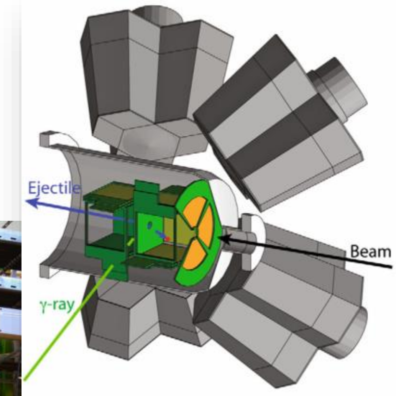


To be implemented next year

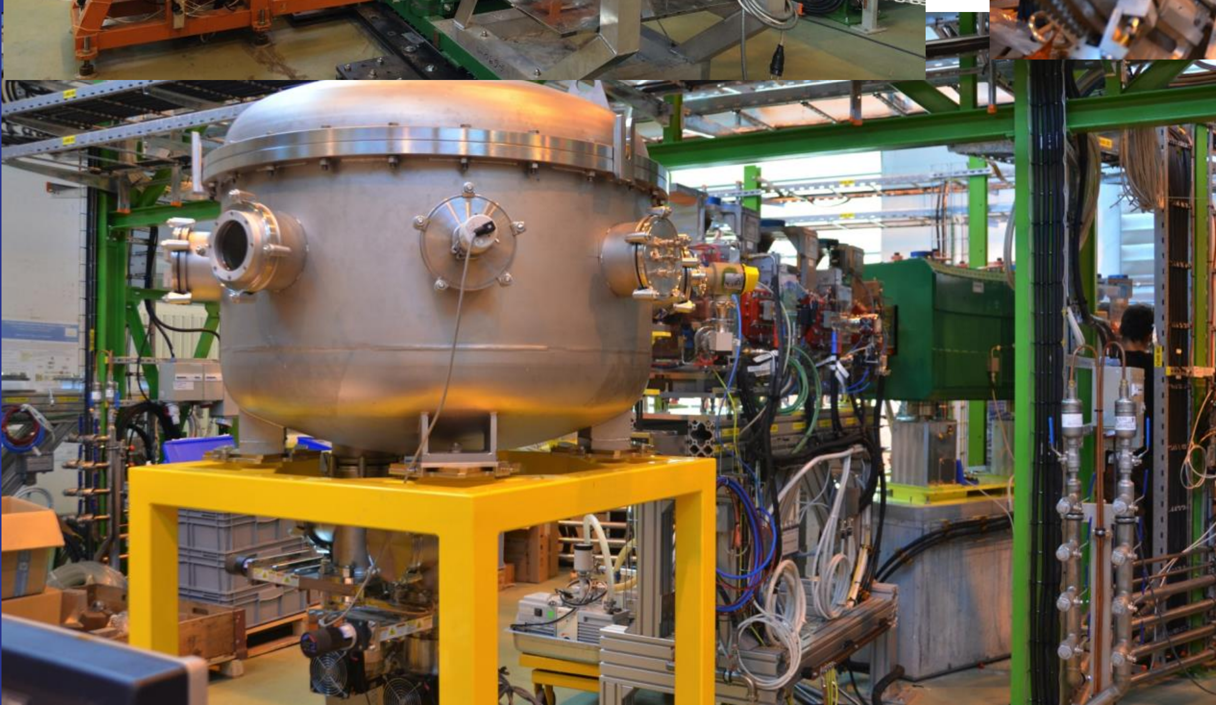


The Full Machine and Beam lines under Vacuum





CD-Chamber already aligned



First Radiactive beams at 4 MeV/u 22nd of October 2015 !

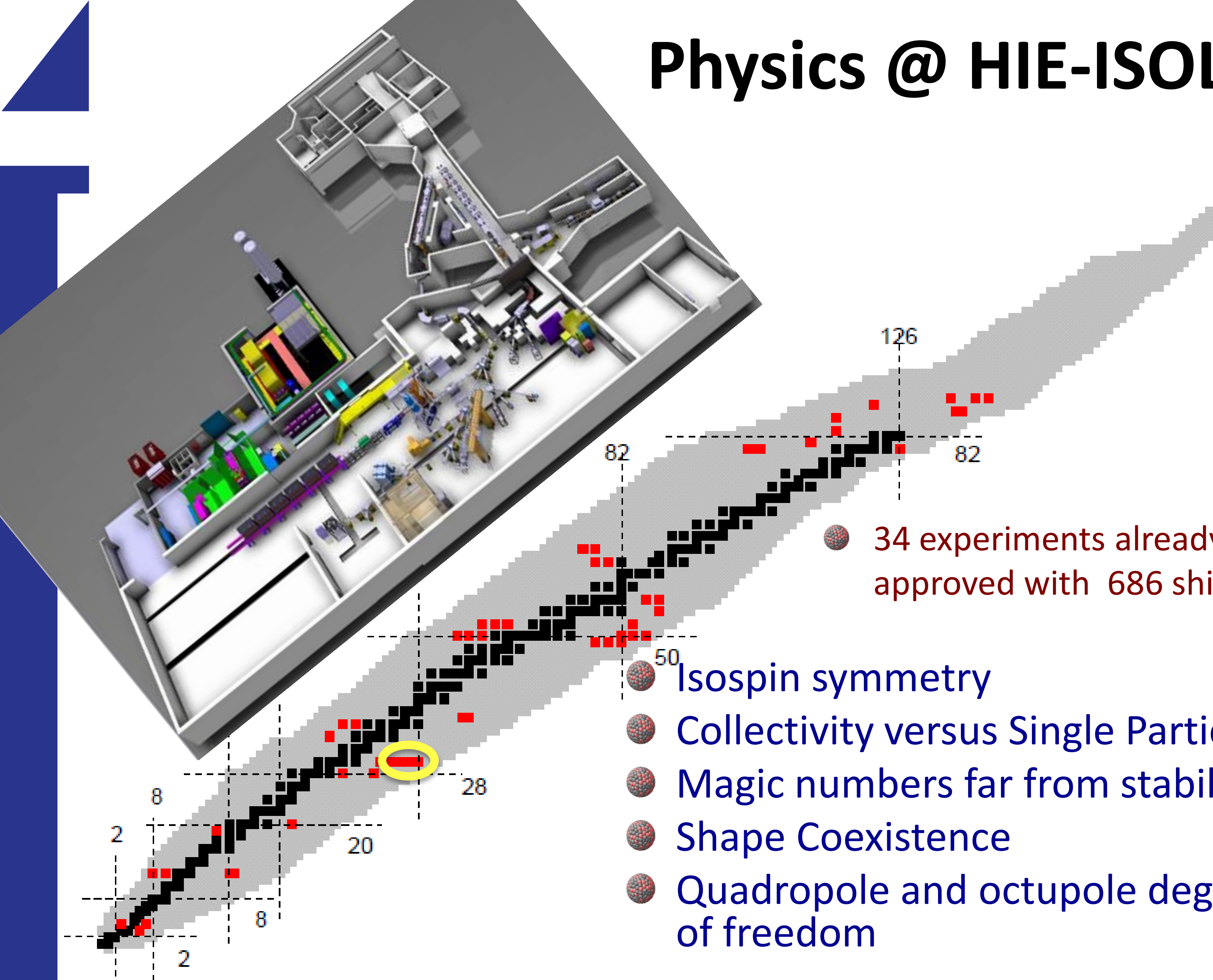
Second Beam line

Operation conditions in 2015/ 2016

- A/q < 3.6 (maximum was A/q=3.52) A/q < 4.0 to 4.5
- Output energy < 4 MeV/u for A/Q = 3.52 (max 4.8 MeV/u, for a short time due to problems with couplers) < 5.5 MeV/u
- Max. Repetition rate: 10 Hz (by the 9-gap amplifier) 30 - 50 Hz
- Max. RF pulse length: 2 ms (at 1 Hz), 200 μs (at 10 Hz)/ 2 ms @ 50 Hz
- Max. Pulse length: 250 μs (possible up to ~500 μs)/ **500 μs**
- Energy spread: ~ 0.7% (FWHM)
- No longitudinal or transverse emittance done

Pending for 2016

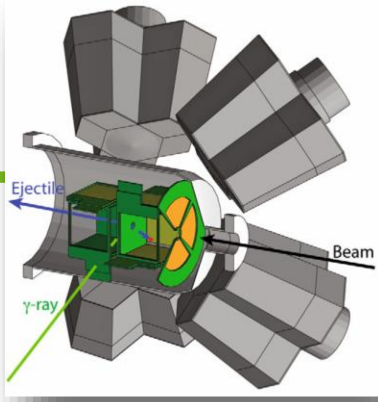
Physics @ HIE-ISOLDE



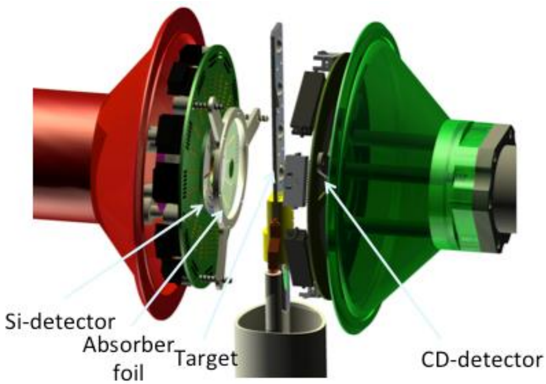
- 34 experiments already approved with 686 shifts

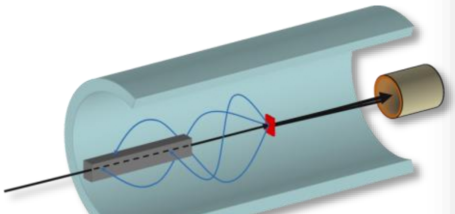
- Isospin symmetry
- Collectivity versus Single Particle
- Magic numbers far from stability
- Shape Coexistence
- Quadropole and octupole degrees of freedom

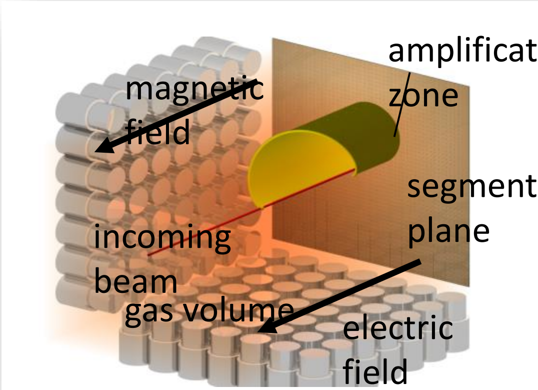
Instrumentation @ HIE



- Miniball + CD : **303 shifts**
- Miniball T-REX: **220 shifts**
- MINIBALL+Cd=SPEDE: **39 shifts**
- Multipurpose reaction chamber : **72 shifts**
- CORSET chamber for fusion-fission reactions: **12**
- Helios type Spectrometer (Hall →@ TSR) 2017-8
- MAYA/ACTAR: resonant scattering + transfer: > **40**
- Zero type spectrometer
- TSR storage ring:







Preparation for 2016

- Two parts should be routinely working next year.
  - Coupler → Be able to work 24h
  - Power amplifier of the 9 gap → Repetition rate of 50 Hz.
- **HIE-ISOLDE Phase 1: with 4.0 MeV/u, the 22nd October 2015. Reaching 5.5 MeV/u in Summer next year.**
- Many experiments waiting for HIE-ISOLDE
  - 1day-Workshop 1st of February at CERN.
- We should identify the best experiments and the sequence for the 12-14 weeks of physics expected next year.

Thanks for your attention !

ISOLDE

Remaining REX Shifts

Exp. no.	Prop. no.	Title experiment	Spokesperson	Contactperson	Status	Remaining Shifts
IS411	P156	Coulomb Excitation of neutron-rich A~140 Nuclei	Habs, D. (taken over by T. Kroll)	J. Cederkall	**Data-Taking**	15,5
IS478	P228	Shape determination in Coulomb excitation of 72Kr	B.S. Nara Singh	J. Pakarinen	Data Taking	13
IS482	P252	Coulomb excitation of neutron-rich 28,29,30Na nuclei with MINIBALL at REX-ISOLDE: Mapping the borders of the island of inversion	P. Reiter	J. Pakarinen	Data Taking	11
IS483	P253	Measurement of the magnetic moment of the 2+ state in neutron-rich radioactive 72,74Zn using the transient field technique in inverse kinematics	A. Junclaus	J. Van De Walle	Data Taking	11
IS502	P276	Study of single particle properties of neutron-rich Na isotopes on the "shore of the island of inversion" by means of neutron-transfer reactions	T. Kröll	J. Pakarinen	Data Taking	33
IS506	P284	Mapping the boundaries of the seniority regime and collective motion: Coulomb excitation studies of N = 122 isotones 206Po and 208Rn	T. Grahn	J. Pakarinen	Data Taking	8
IS510	P289	Evolution of the proton-neutron interaction towards Ni-78: Vibrational Structure of Zn-72 and Zn-74	D. Muecher	J. Pakarinen	Data Taking	0
IS512	P292	Resonance proton scattering of 22Mg and 21Na	J. Cederkall	M. Kowalska	Data Taking	0
IS516	P296	Coulomb excitation of 116Te and 118Te: a study of collectivity above the Z = 50 shell gap	T. Grahn; R. Wadsworth	J. Pakarinen	Data Taking	6
IS523	P305	Determination of the B(E3,0+ -> 3-) strength in the octupole correlated nucleus 144Ba using Coulomb excitation	M. Scheck, D.T. Joss	J. Pakarinen	Data Taking	18
						115,5