

The HITRAP Decelerator Linac at GSI



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Darmstadt



Frankfurt



Heidelberg

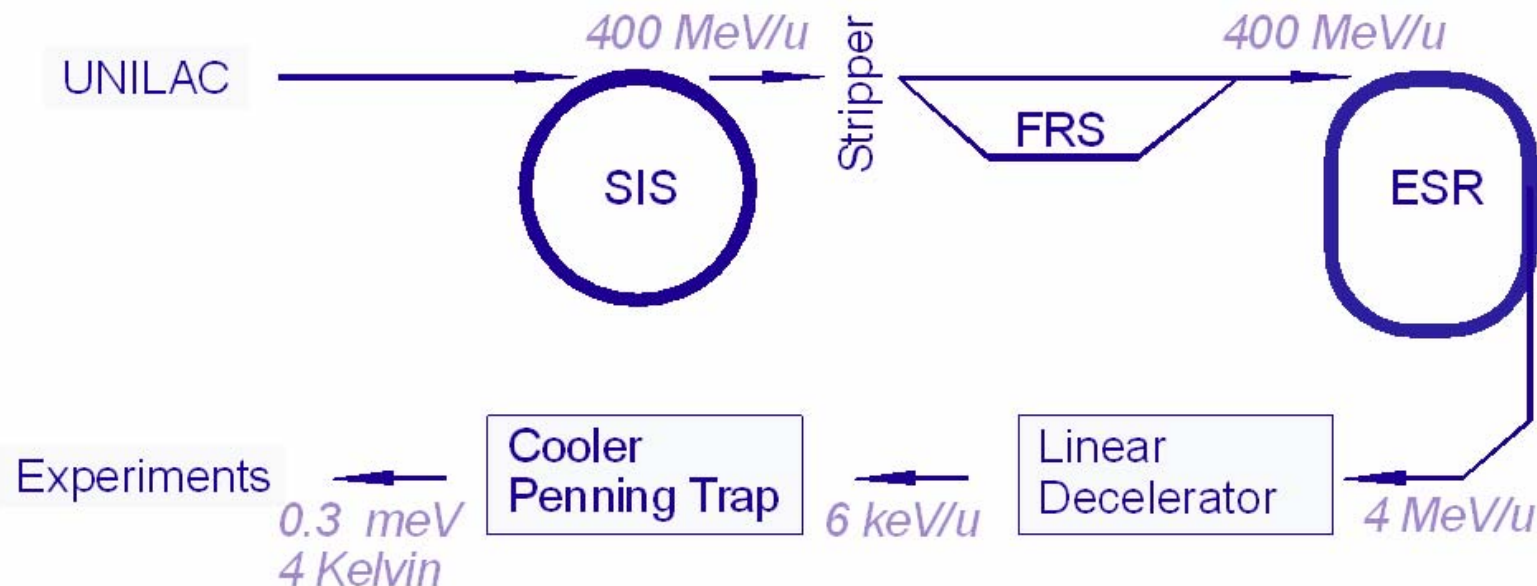


Mainz



Groningen

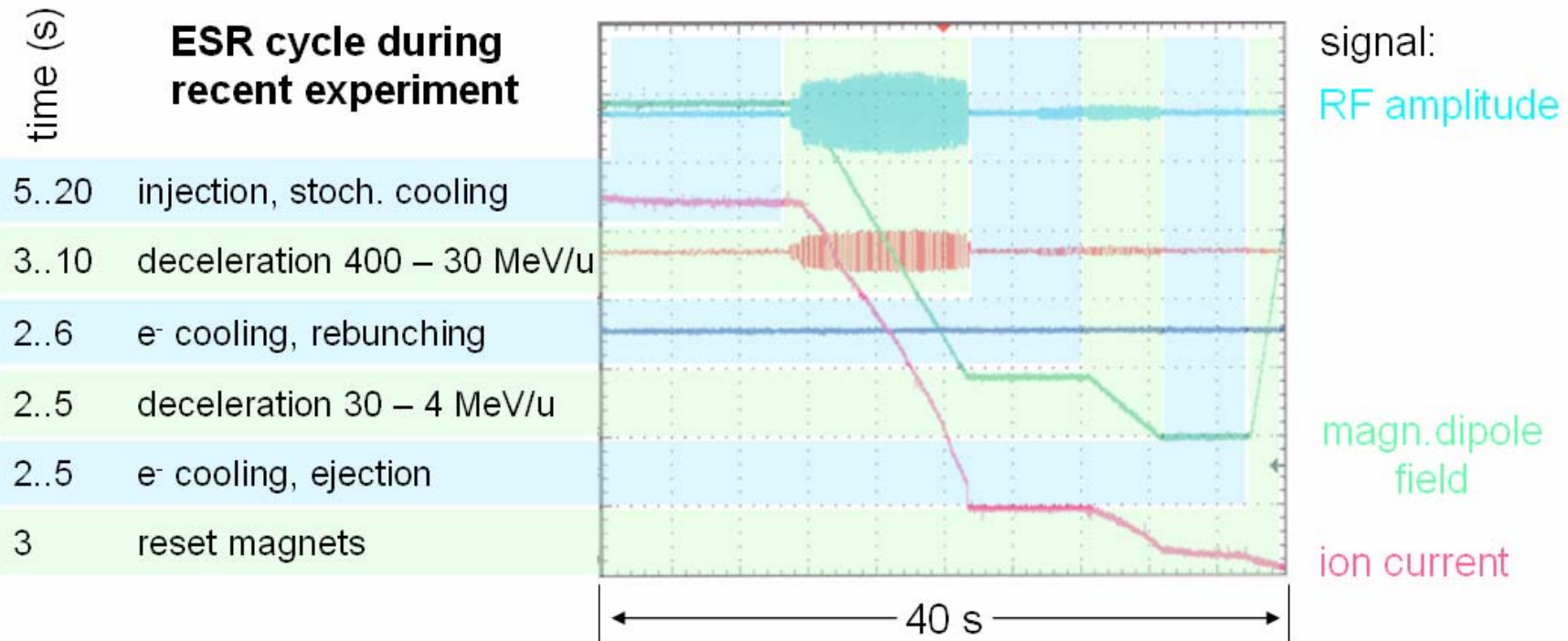
HITRAP – Production of slow HCI



- g-factor of the bound electron
- hyperfine spectroscopy with laser light
- collision studies highly-charged ions (HCI) – atoms
- high-precision mass measurements
- highly-charged ions (HCI) - surface interactions
- hollow atom spectroscopy

ESR – From 400 to 4 MeV/u

ESR – Experimental Storage Ring at GSI with stochastic and electron cooling



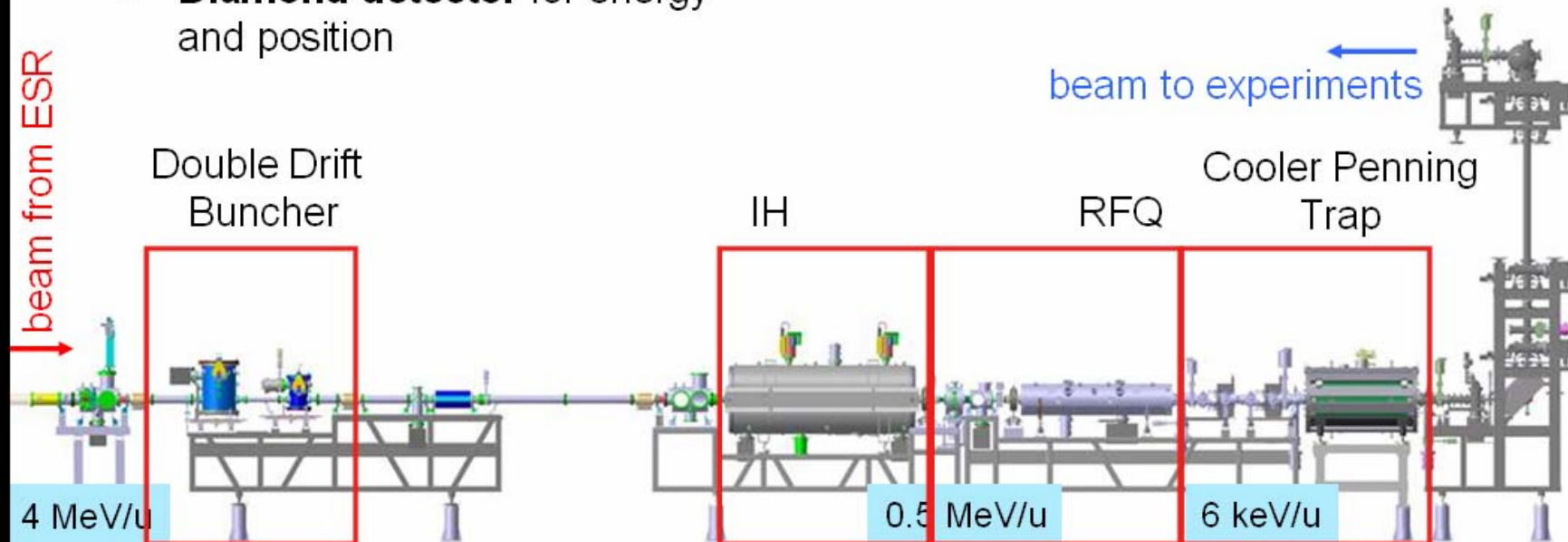
HITRAP – Linear Decelerator

Instrumentation for beam diagnostics

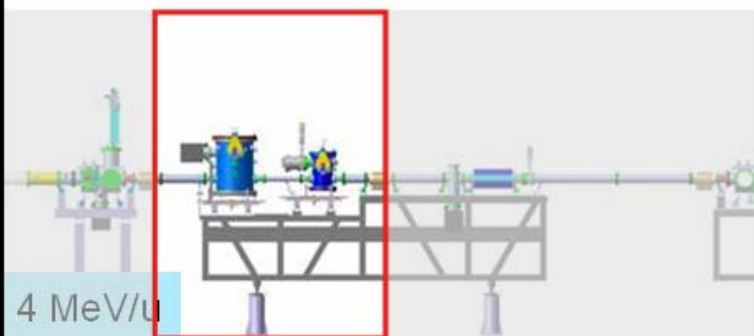
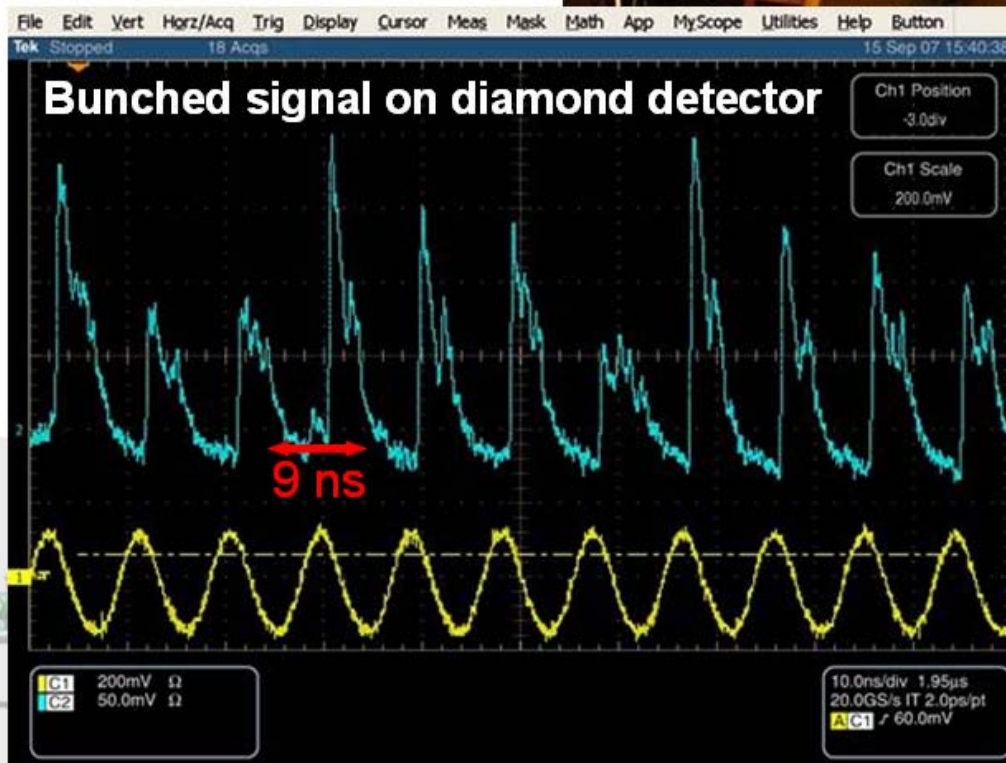
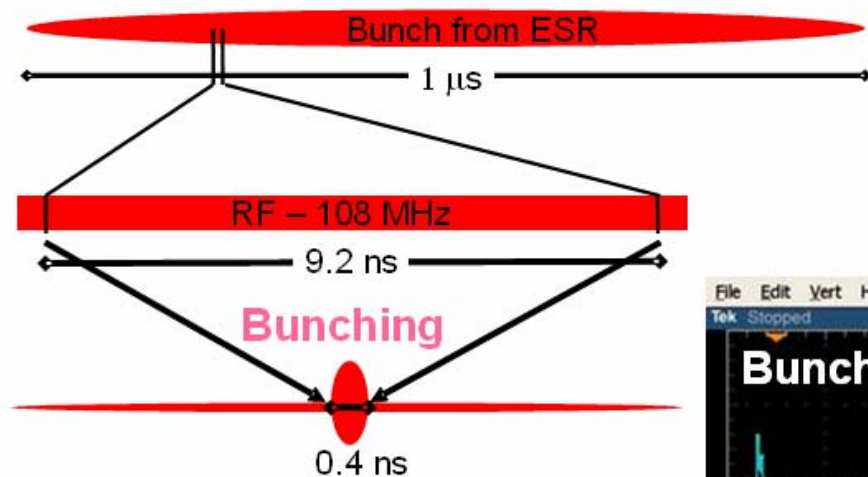
- Scintillation screens based on YAG single crystals
- Capacitive phase probes
- Wire grids
- Faraday cups
- **Diamond detector** for energy and position

Beam that will be available to users:

type	$A/q < 3$ (U^{92+} ...)
ions/pulse	10^5
energy	keV/q ... meV/q
energy spread	≥ 0.3 meV

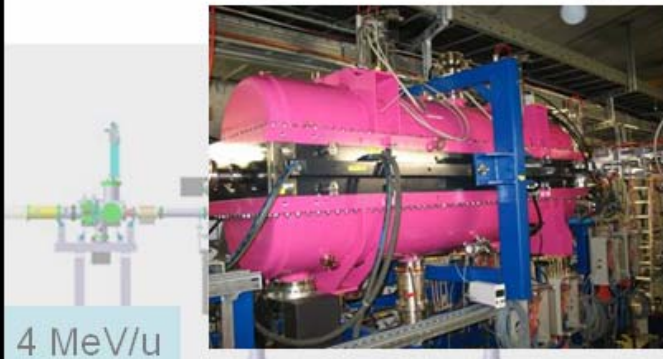
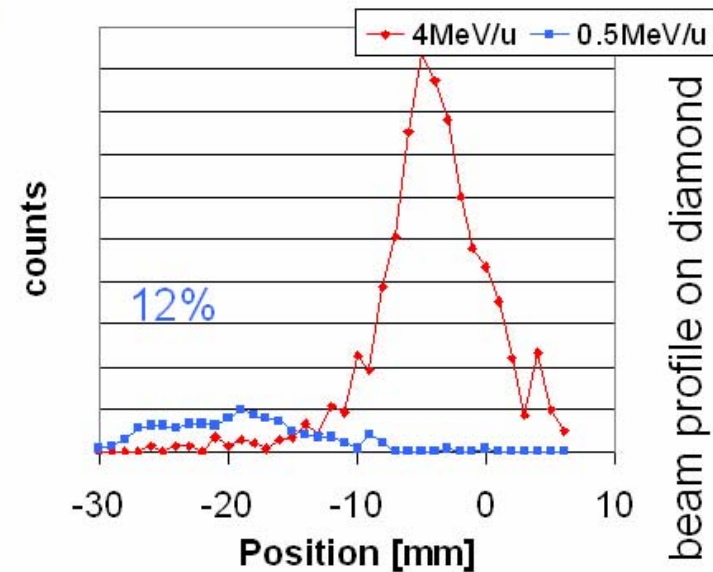
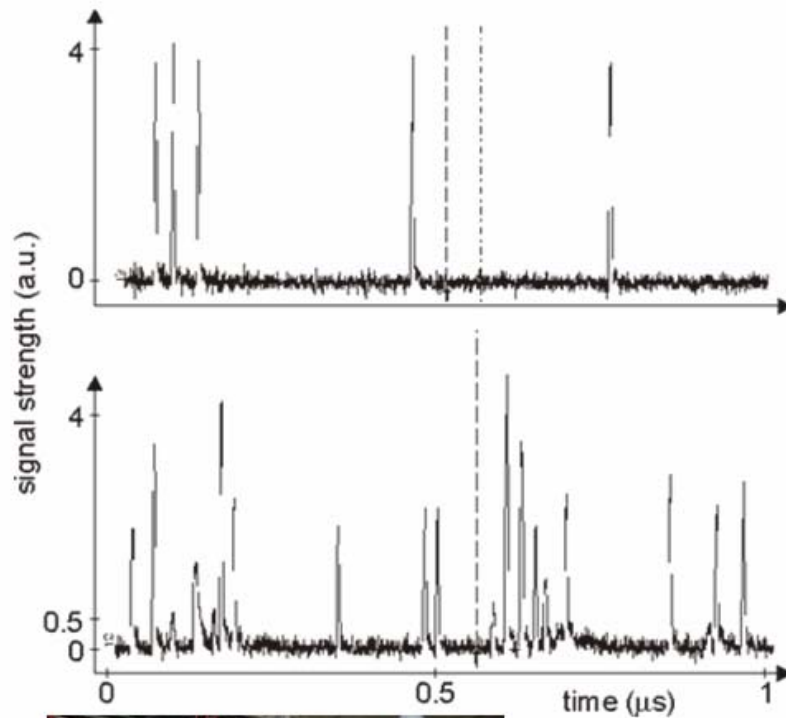


HITRAP – Double Drift Buncher

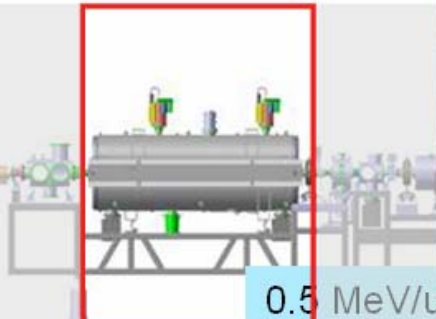


HITRAP – IH Structure

single ions signal on diamond



4 MeV/u



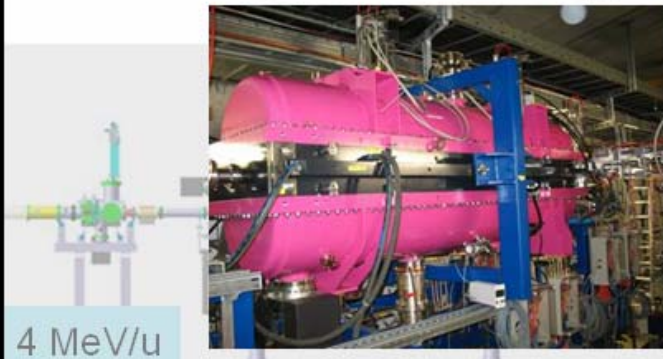
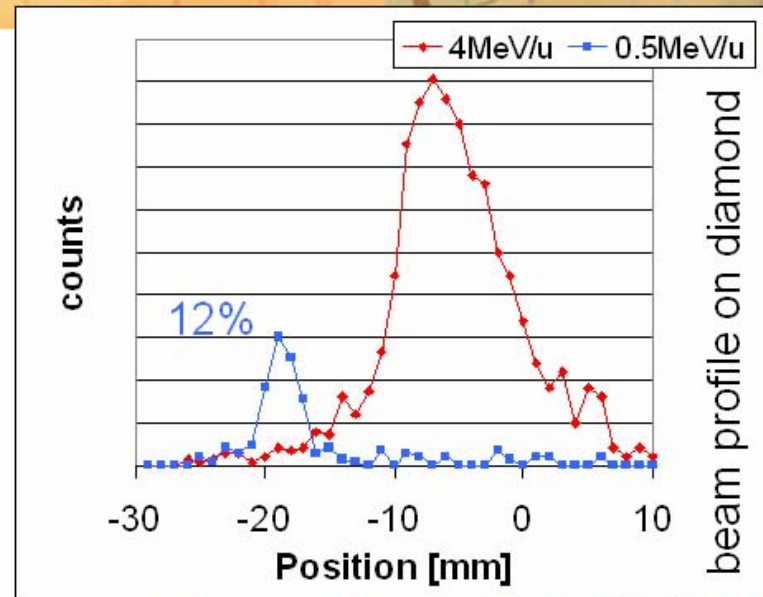
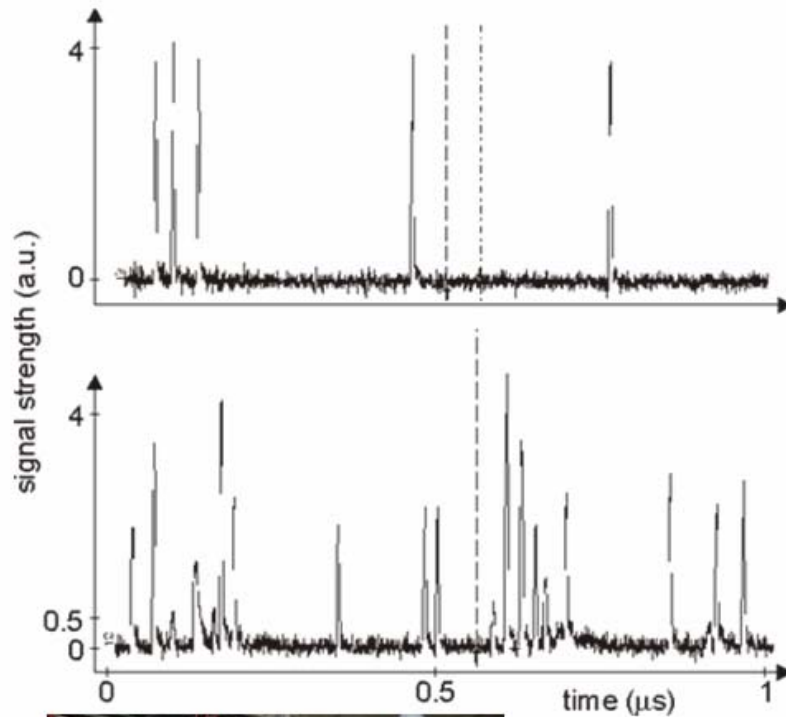
0.5 MeV/u



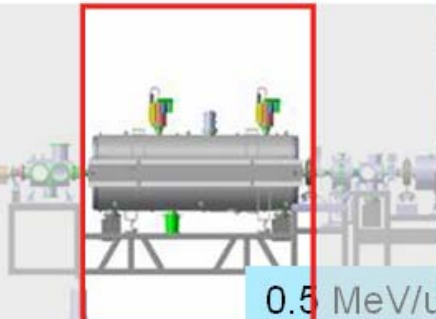
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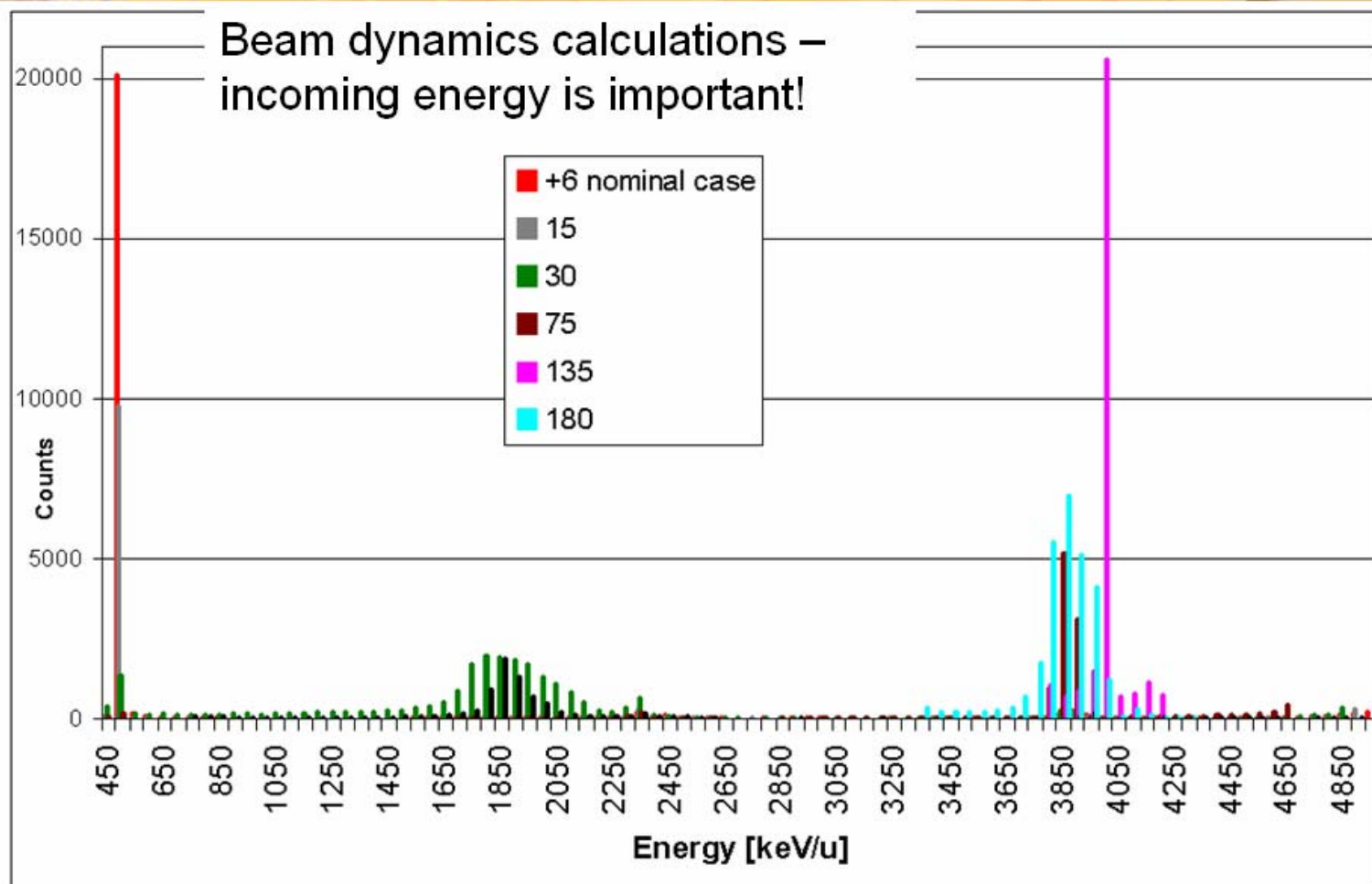


0.5 MeV/u



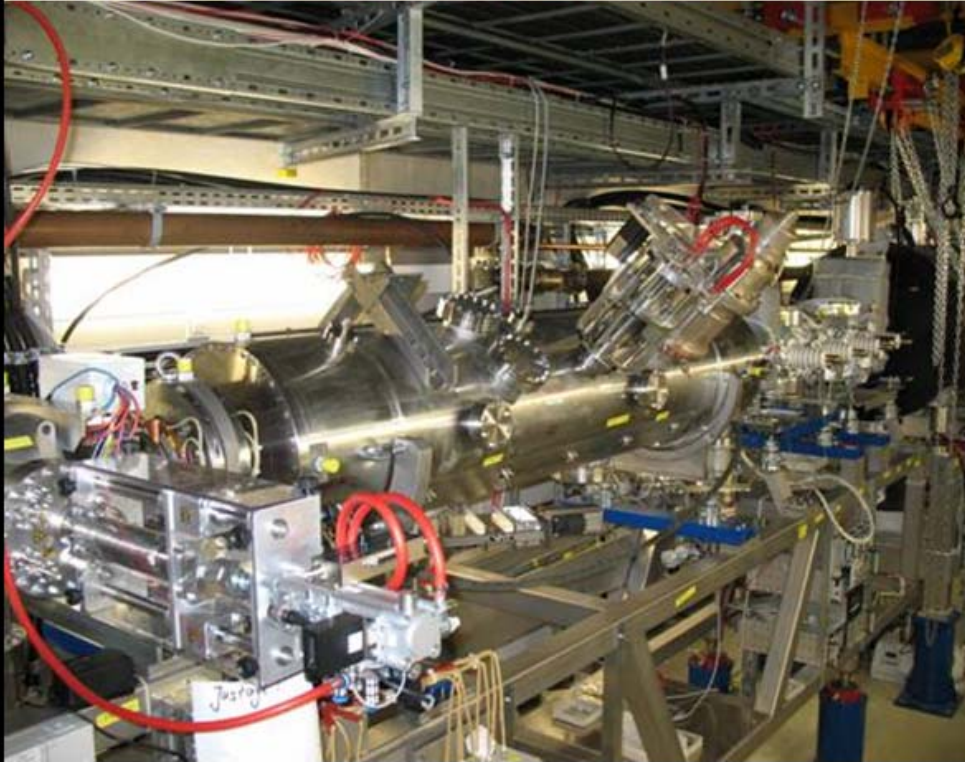
0.5 MeV/u

IH Structure – Energy Spectrum



G. Clemente

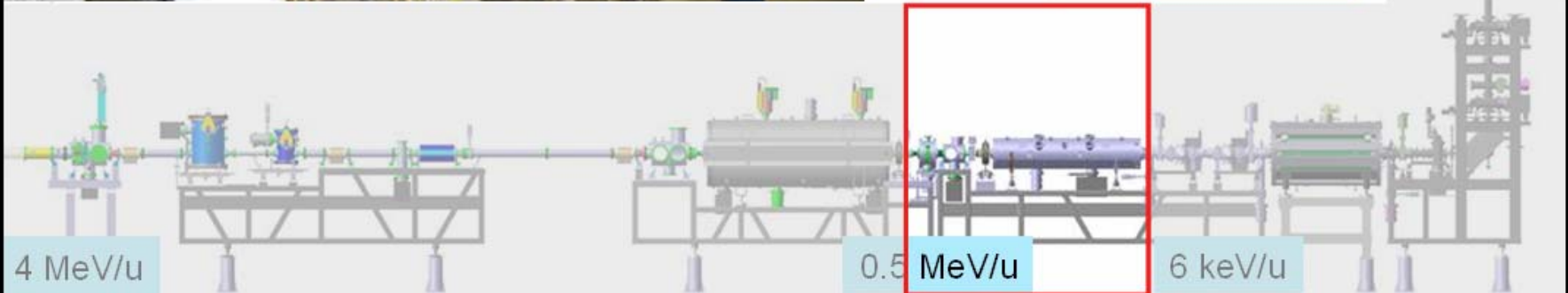
HITRAP – ReBuncher & RFQ



- deceleration from 0.5 MeV/u to 6 keV/u
- installed



new single shot
emittance meter

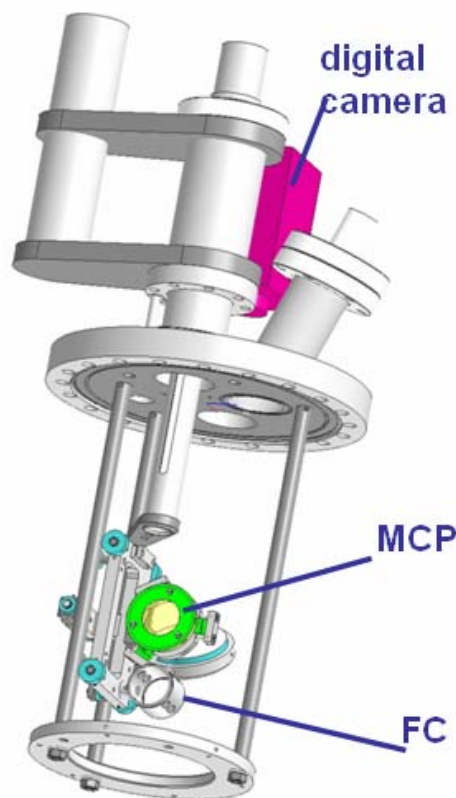


4 MeV/u

0.5 MeV/u

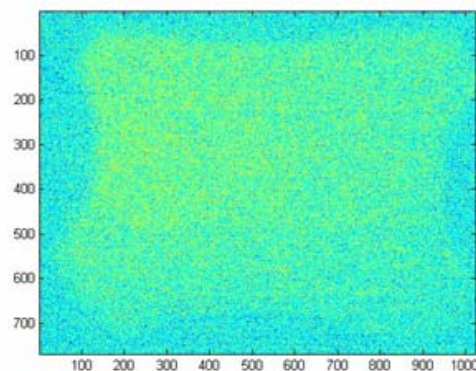
6 keV/u

First Beam behind RFQ

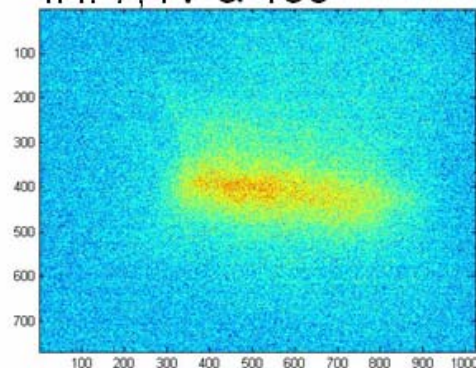


low energy, low intensity
MCP-based imaging detector

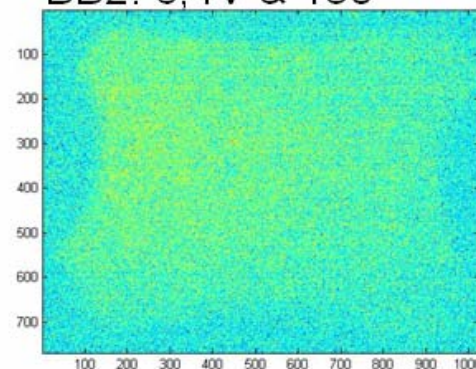
all RF off



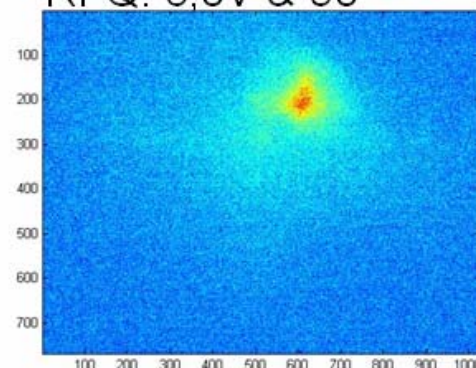
BB1 & BB2
IH: 7,1V & 150°



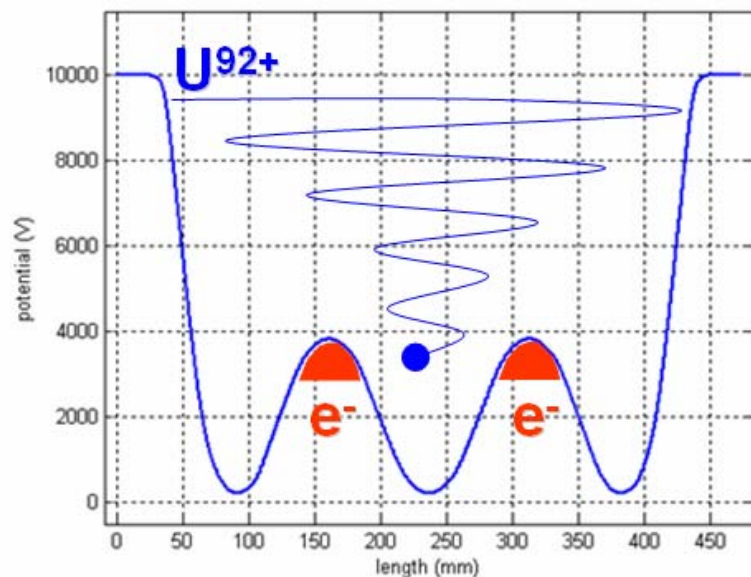
BB1: 8,5V & 0°
BB2: 6,1V & 150°



BB1, BB2 & IH
RFQ: 6,0V & 90°



HITRAP – LEBT & Cooler Trap



- catch the ions in flight
- cool them with combined electron and resistive cooling to ~ 4 Kelvin



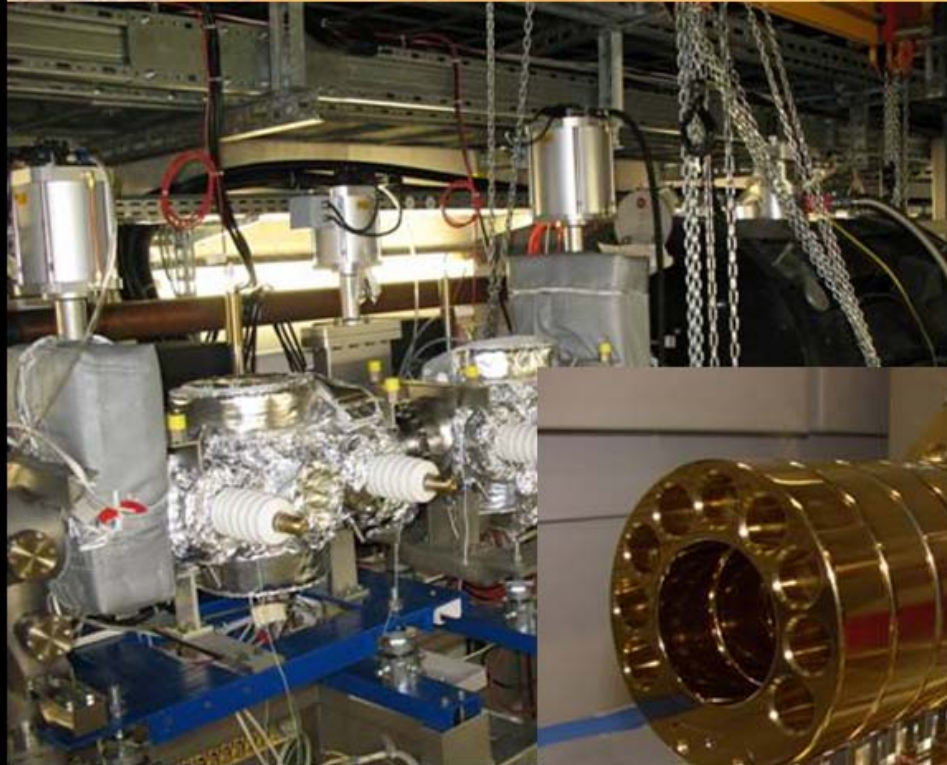
HITRAP – LEBT & Cooler Trap



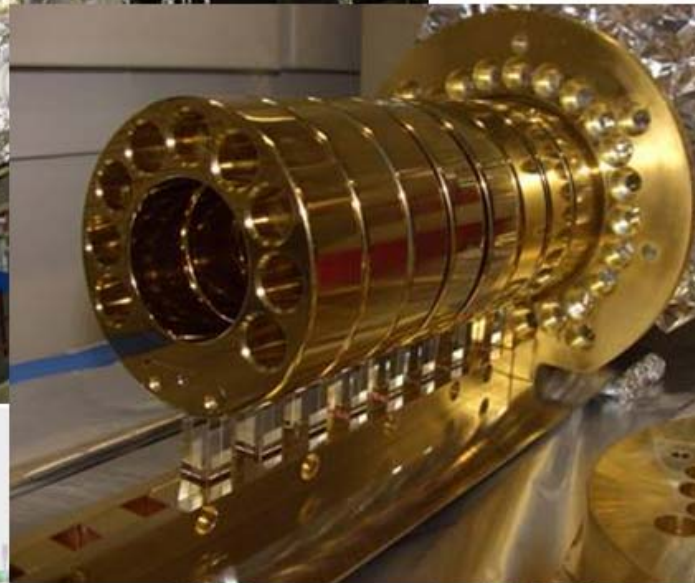
- LEBT installed, trap magnet installed and tested
- trap electrodes ready, assembly in progress



HITRAP – LEBT & Cooler Trap

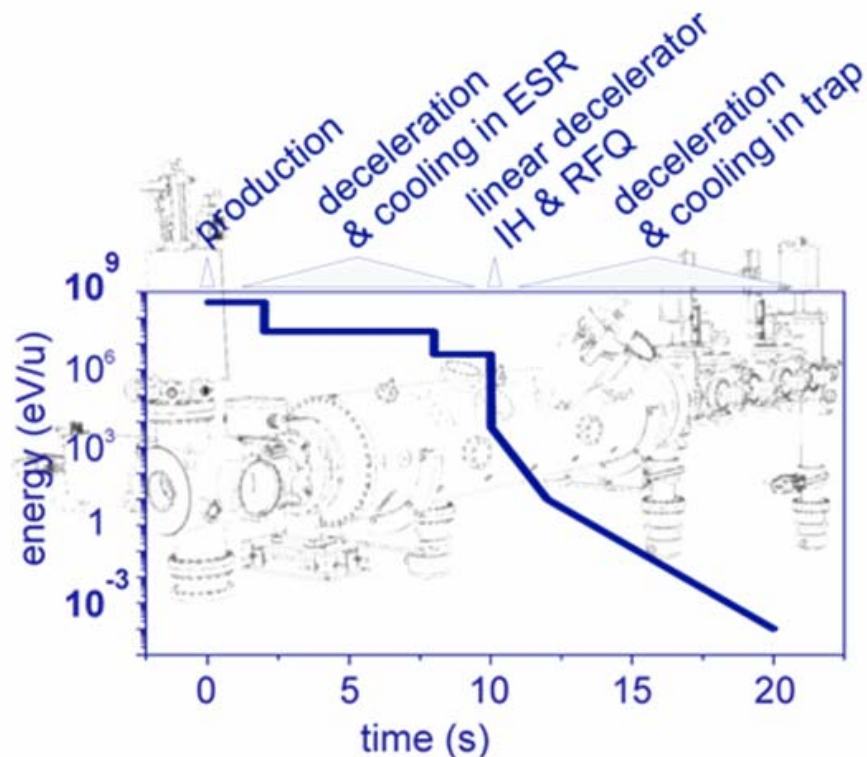


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Summary

- HITRAP will be the strongest source for heavy, highly-charged ions
- A linear decelerator has been constructed – key components are an IH, a RFQ and a Penning trap
- First deceleration has been achieved



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