

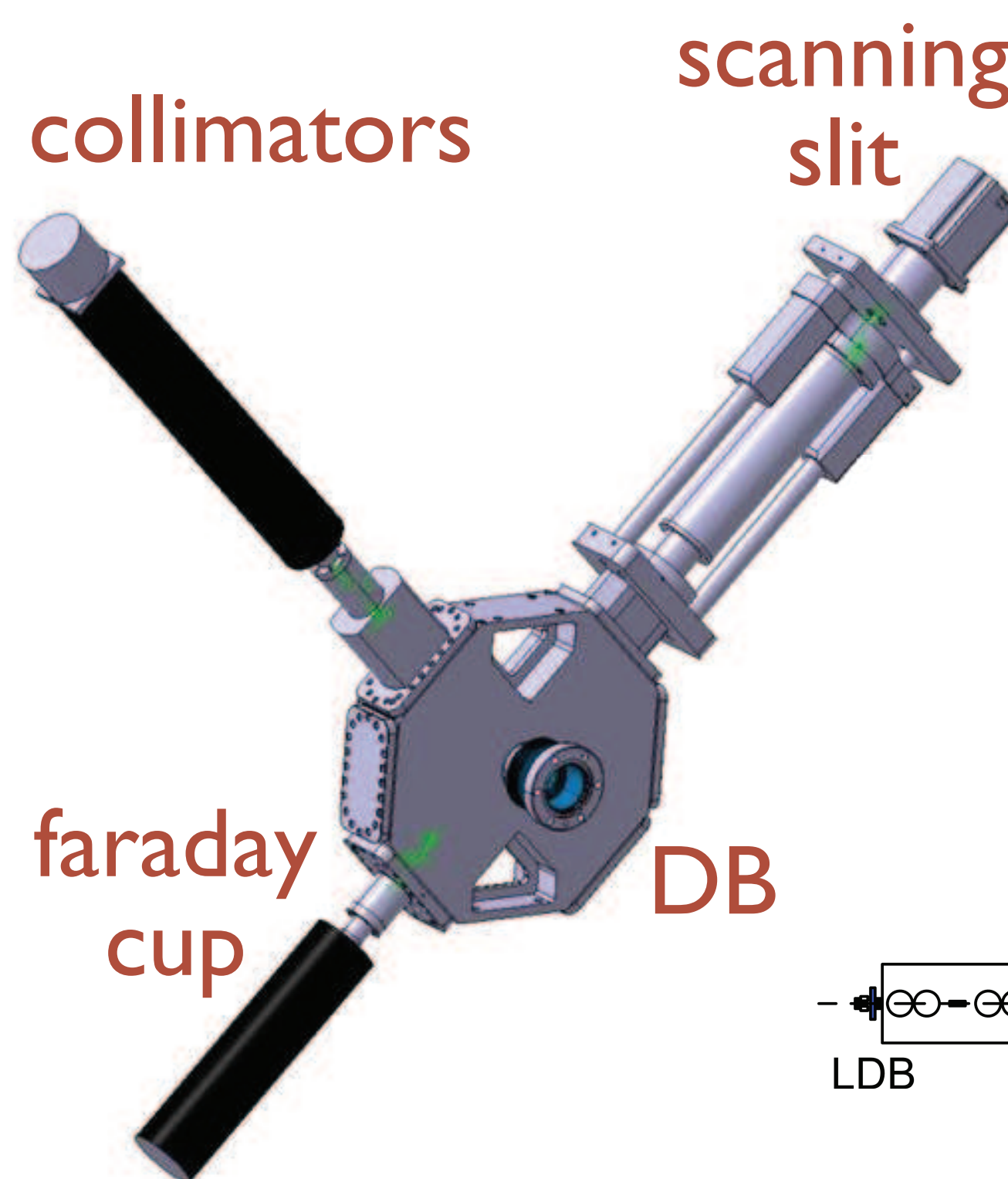
# THE STATUS OF BEAM DIAGNOSTICS FOR THE HIE-ISOLDE LINAC AT CERN

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## Introduction

A major upgrade of the on-line isotope mass separator facility ISOLDE at CERN is taking place since 2010 under the HIE-ISOLDE project. The technical challenges for beam diagnostics include the development of new instruments for low intensity ion beams of energies up to 10 MeV/u. Moreover, in the intercryomodule regions of the superconducting LINAC, the longitudinal space available for beam instrumentation is very limited (58 mm) due to restrictions coming from the beam optics design. As a consequence all the devices need to be designed with a very compact geometry.

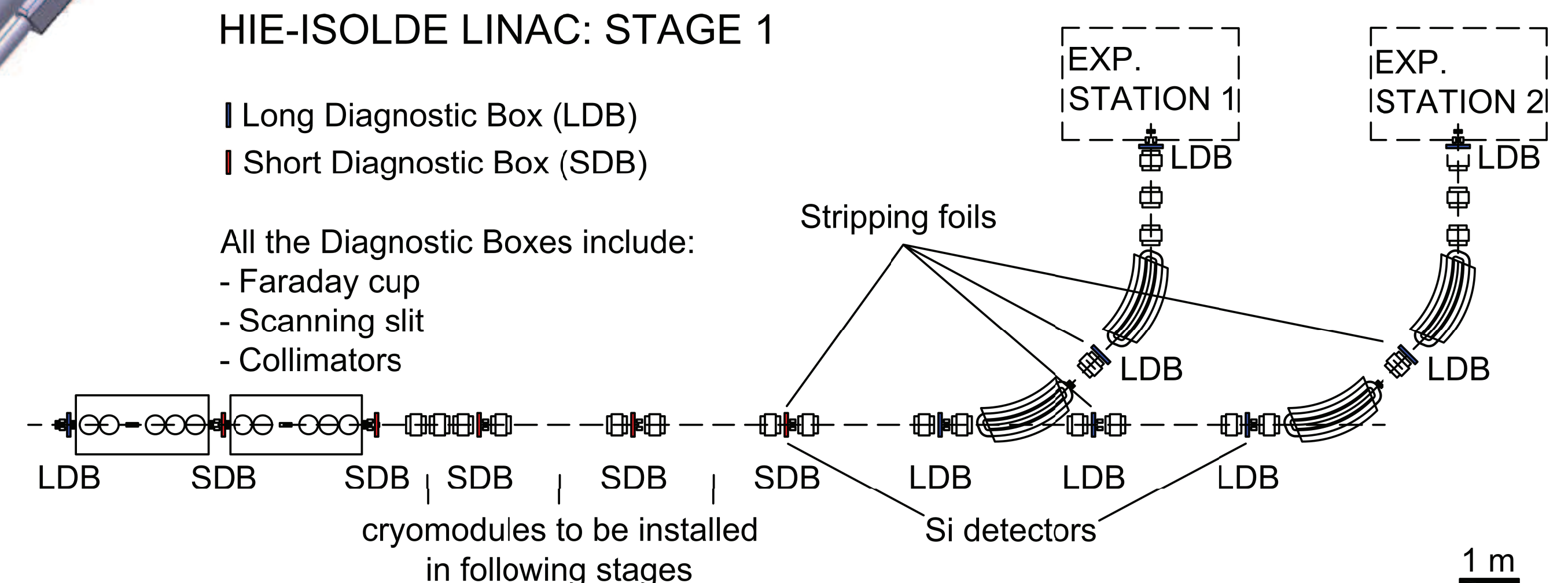


8 long diagnostic boxes  
5 short diagnostic boxes

HIE-ISOLDE LINAC: STAGE 1

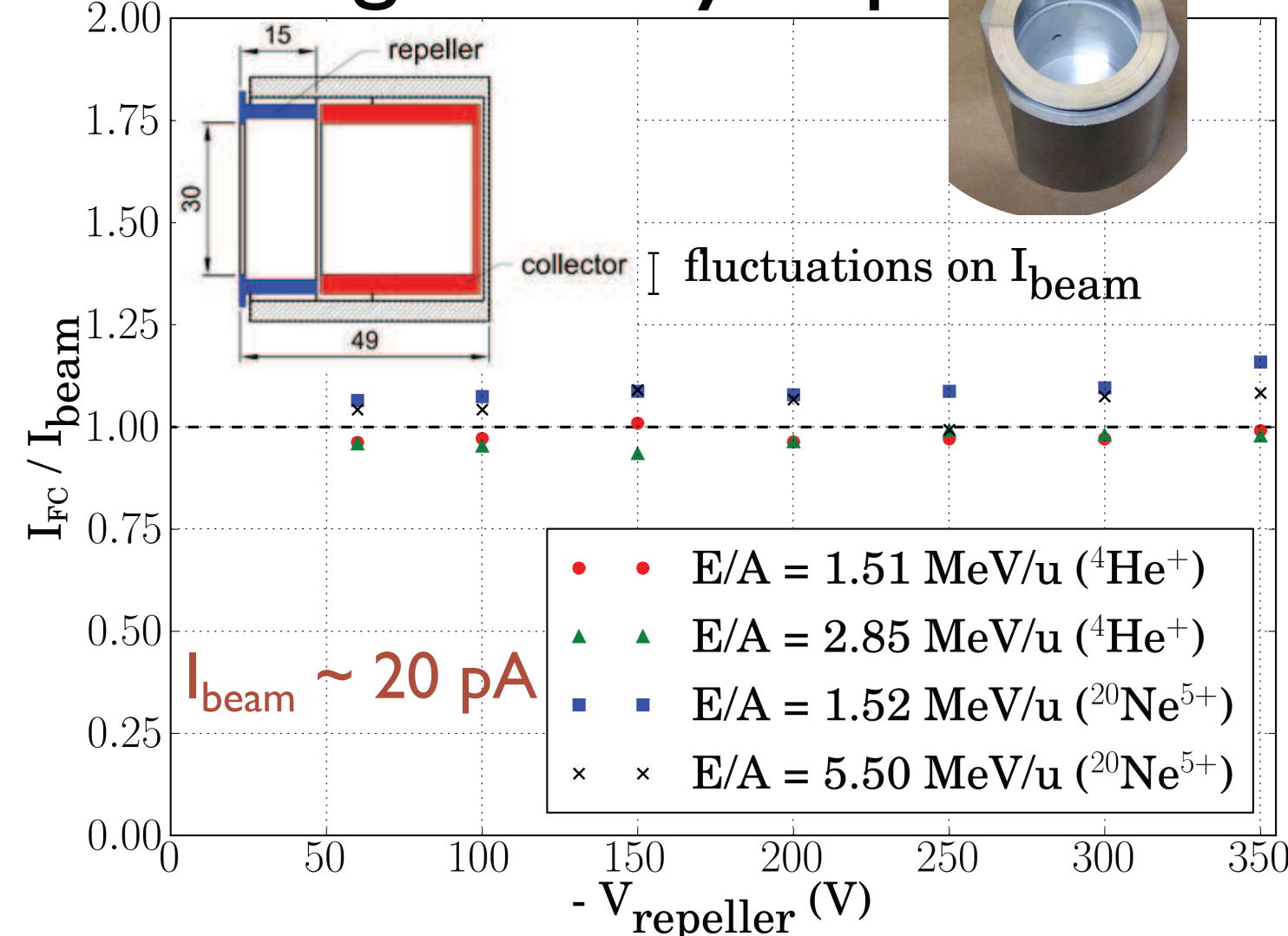
Long Diagnostic Box (LDB)  
Short Diagnostic Box (SDB)

All the Diagnostic Boxes include:  
- Faraday cup  
- Scanning slit  
- Collimators

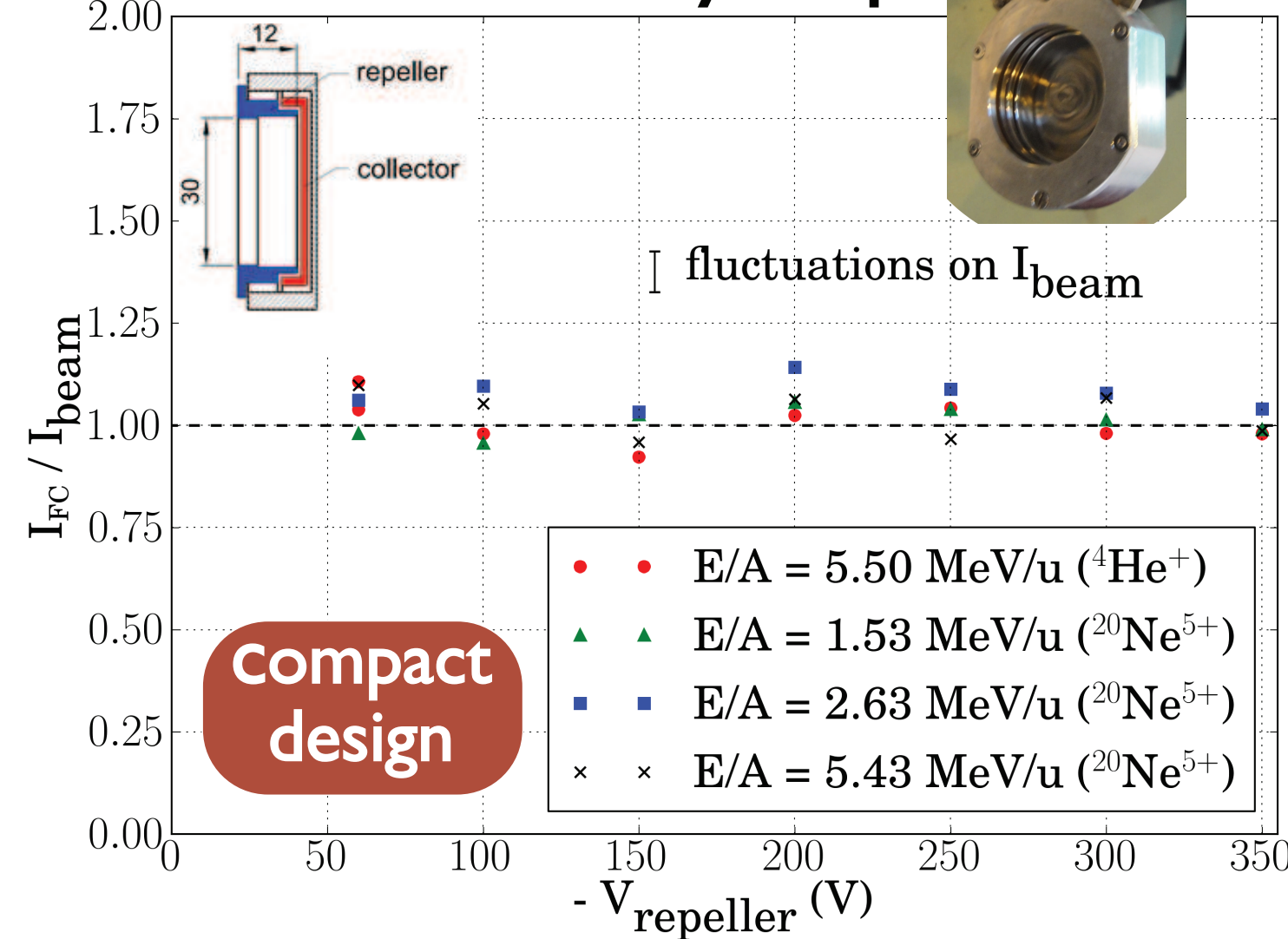


## Beam current

long Faraday cup

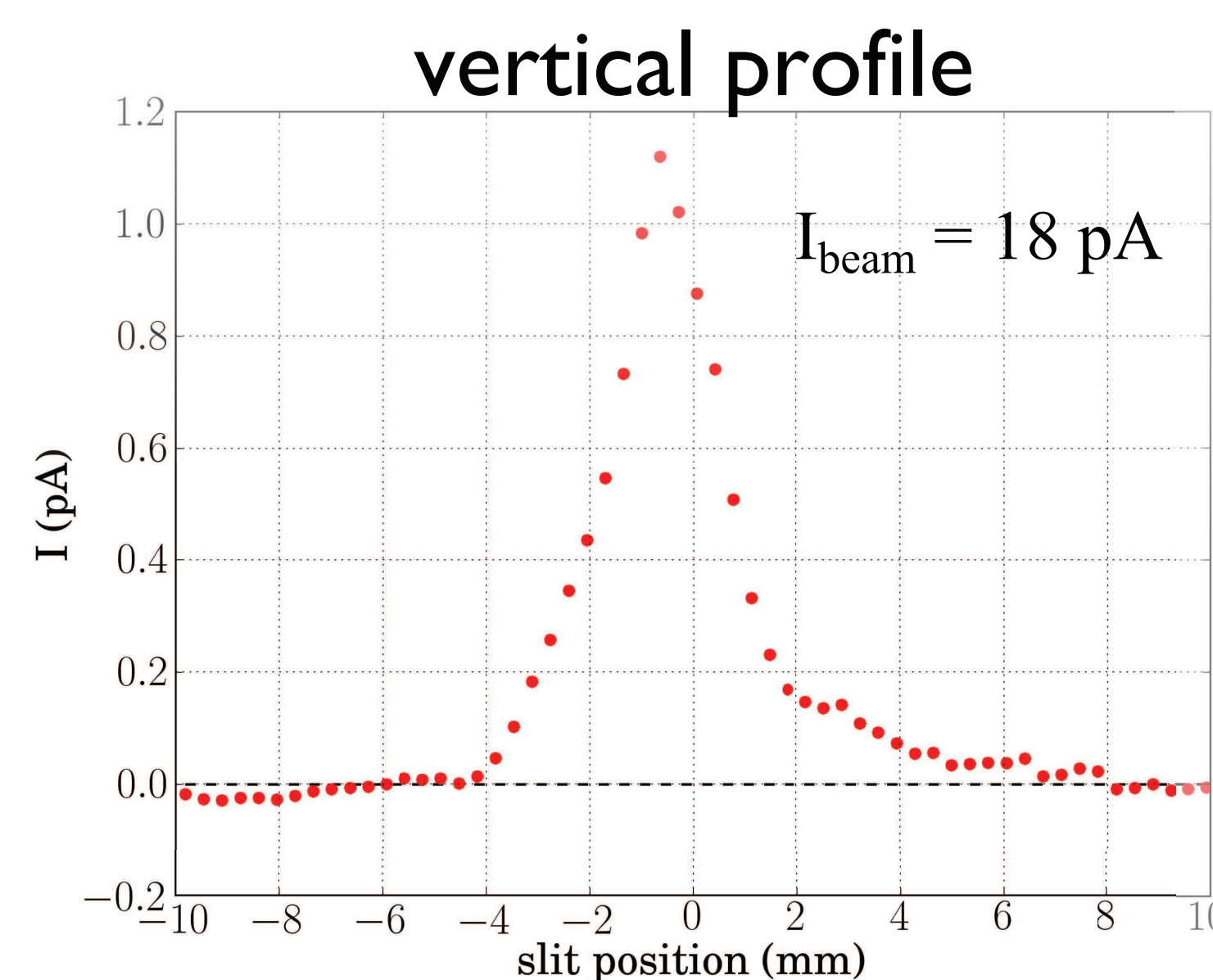
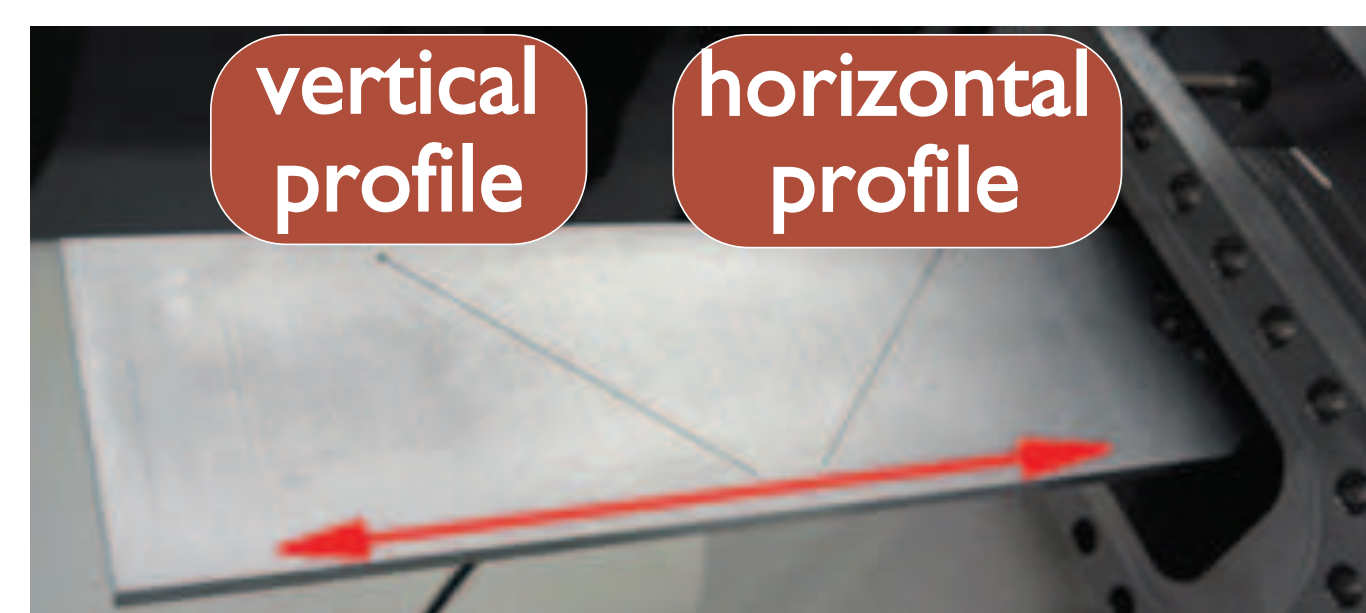


short Faraday cup



## Transverse profile & position

scanning slits + FC



## Longitudinal profile

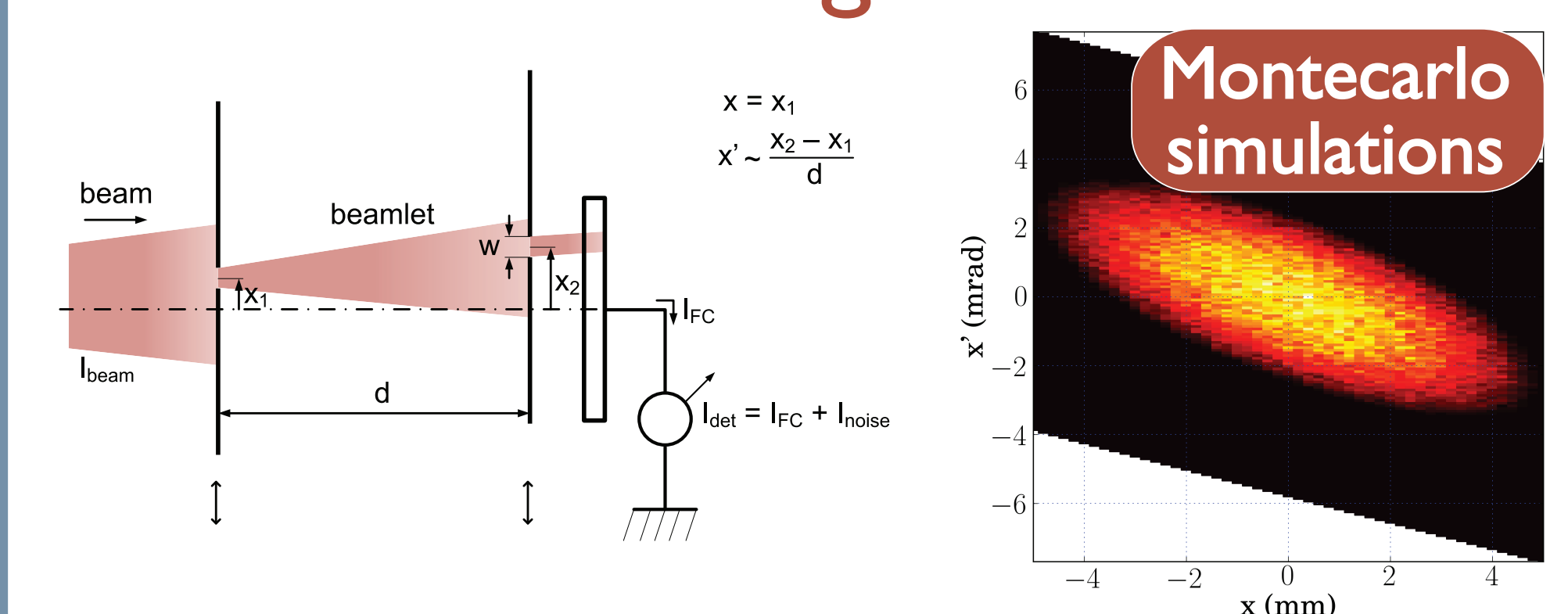


silicon detectors  
PIPS TMPD50-16-300RM  
energy and time  
of flight spectra

F. Zocca et al, NIM A 672, 21 (2012)

## Transverse emittance

2 x scanning slits + FC



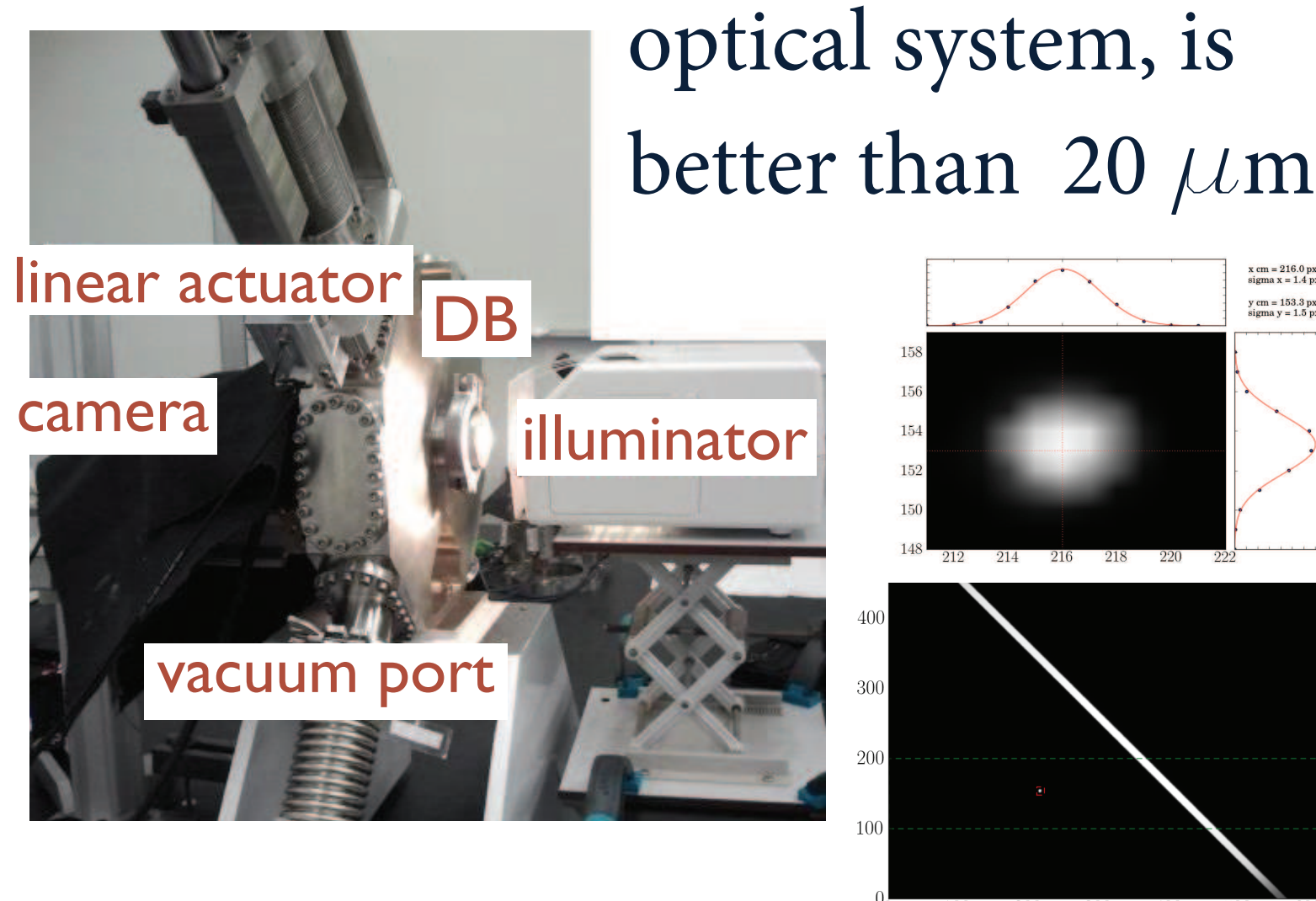
optimum slit width: 1 mm

## Electronics & controls

- New VME board designed for controlling the actuators (stepper motors) and the FC acquisition.
- New front-end preamplifier for the Faraday cup.
- Two main FESA servers, one for the diagnostic box system and one specific for the Si detector.

## Actuators test

The position accuracy of the linear actuator for the movement of the scanning slit, characterised with an optical system, is better than 20  $\mu\text{m}$



## Status & future work

The **design** of the instruments for the HIE-ISOLDE project has been **finalised**. Tests with prototypes have been performed with all the devices, showing that they fulfill all the functional specifications. The production of the fully assembled diagnostic boxes is currently in its final stages, with contracts signed with external companies. The series production of the electronic cards and preamplifiers will be delivered in October 2014. **Installation** of the equipment is foreseen to start at the **beginning of 2015**, with **commissioning** with beam scheduled to start in July 2015.