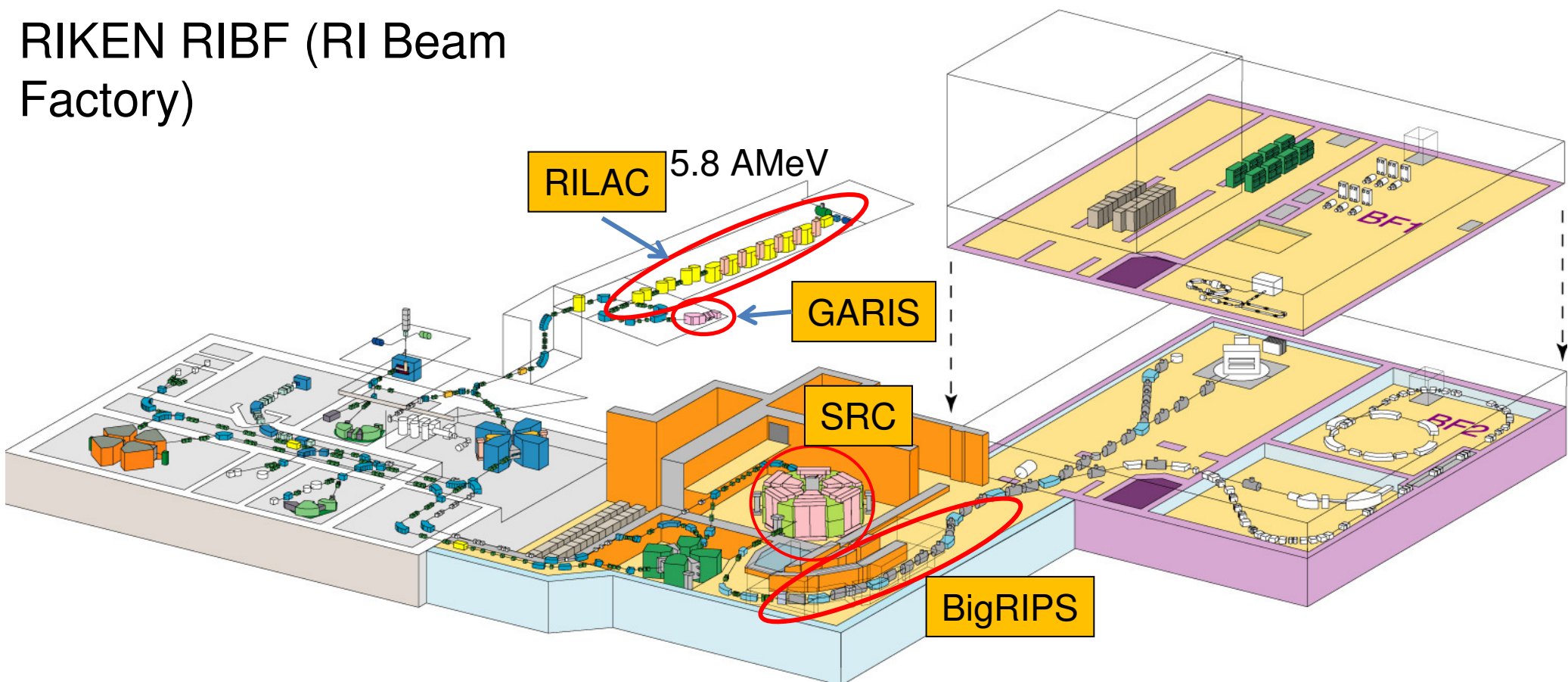


Future Plan of the Experimental Program on Synthesizing the Heaviest Element at RIKEN

Kosuke Morita
Superheavy Element Laboratory,
RIKEN Nishina Center, RIKEN



RIKEN RIBF (RI Beam Factory)



祝!! SRC first beam ($^{27}\text{Al}/345 \text{ A MeV}$) extracted Dec. 28 2006

祝!! SRC $^{238}\text{U}/345 \text{ A MeV}$ beam extracted Mar. 23 2007

祝!! New Isotope ^{125}Pd extracted from BigRIPS May 2007 ^{238}U beam

Now RILAC: Injector for RRC, SRC

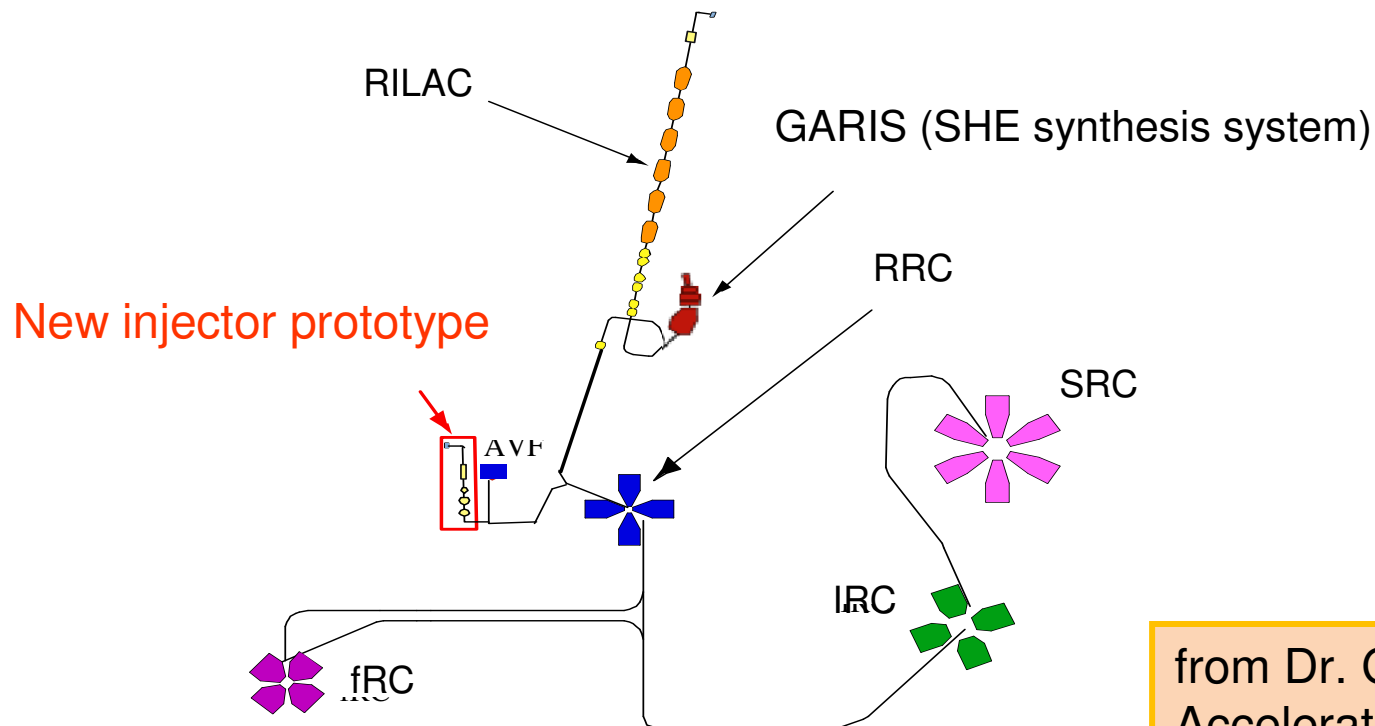
New Injector (prototype) for RRC, SRC will be installed (2009).

→ RILAC: for SHE research

Upgrade of U beam intensity

R&D for a new injector system has started:

- to produce high-intensity U beams so as to allow us to obtain the intensity of **1 pμA at 345 MeV/u**, and
- to make it possible to conduct both experiments at RIBF and experiments for **super-heavy-element synthesis simultaneously**.



from Dr. Goto/ Director of
Accelerator Development G.

Configuration of New Injector Prototype

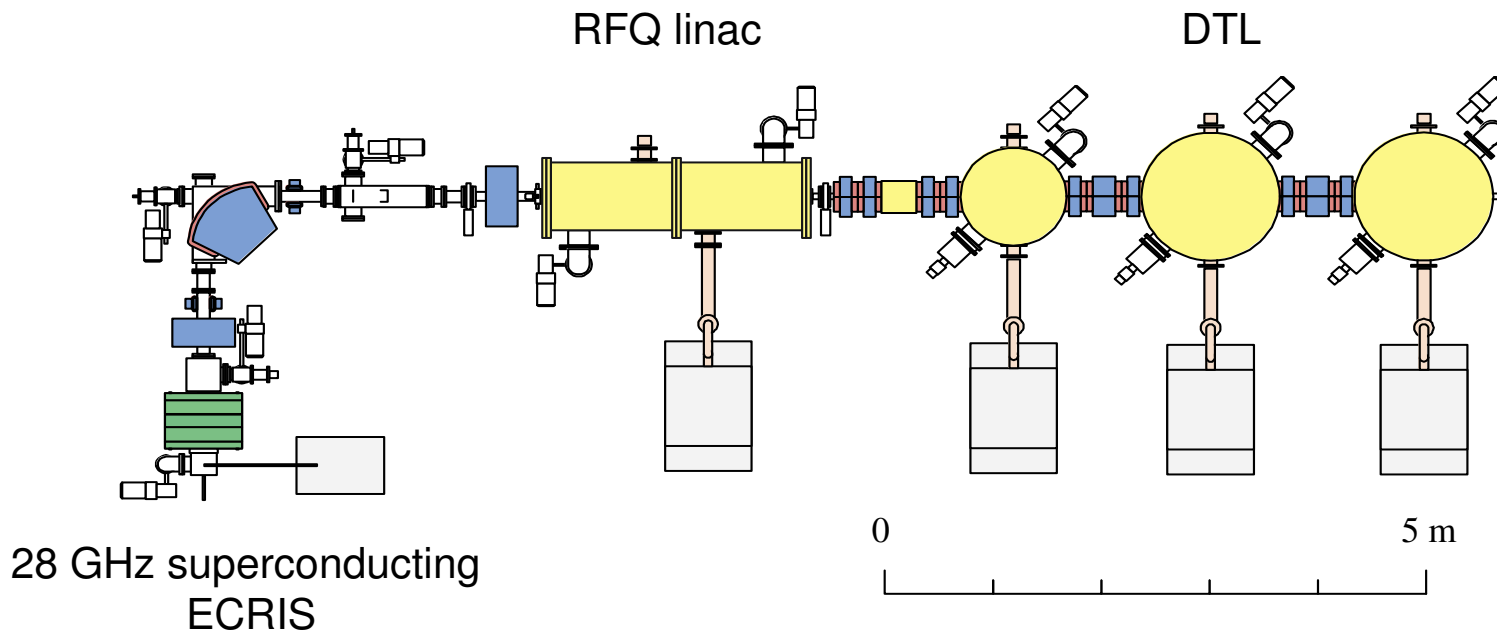
- 28 GHz superconducting ECRIS

Intensity of U ions is to be increased by **two orders**.

Scheduled to be completed in the summer of 2008.

- RFQ linac + DTL

- **The whole system is scheduled to be completed in the spring of 2009.**



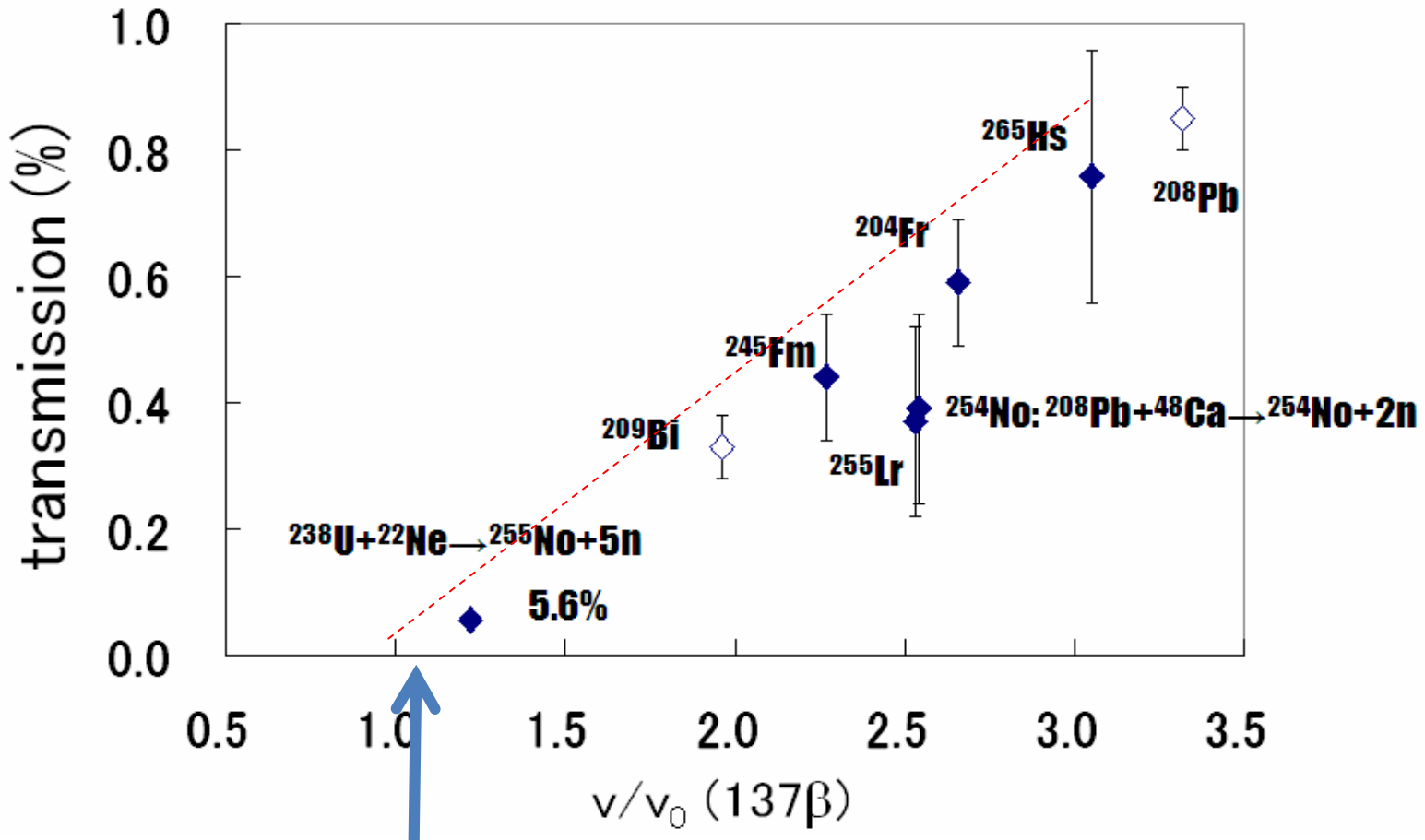
Scientific Subjects

- I. Search for the heaviest elements
- II. Spectroscopy of the heavy nuclei
- III. Chemistry of the superheavy elements

Technical development

- I. Increase of a beam intensity
- II. Target for high intensity beam
- III. Installation of a new recoil separator**
- IV. Detector for A and/or Z identification
- V. Apparatus for chemistry experiment
- VI. ^{248}Cm target
- VII. γ -/X-ray detector at the focal plane of GARIS

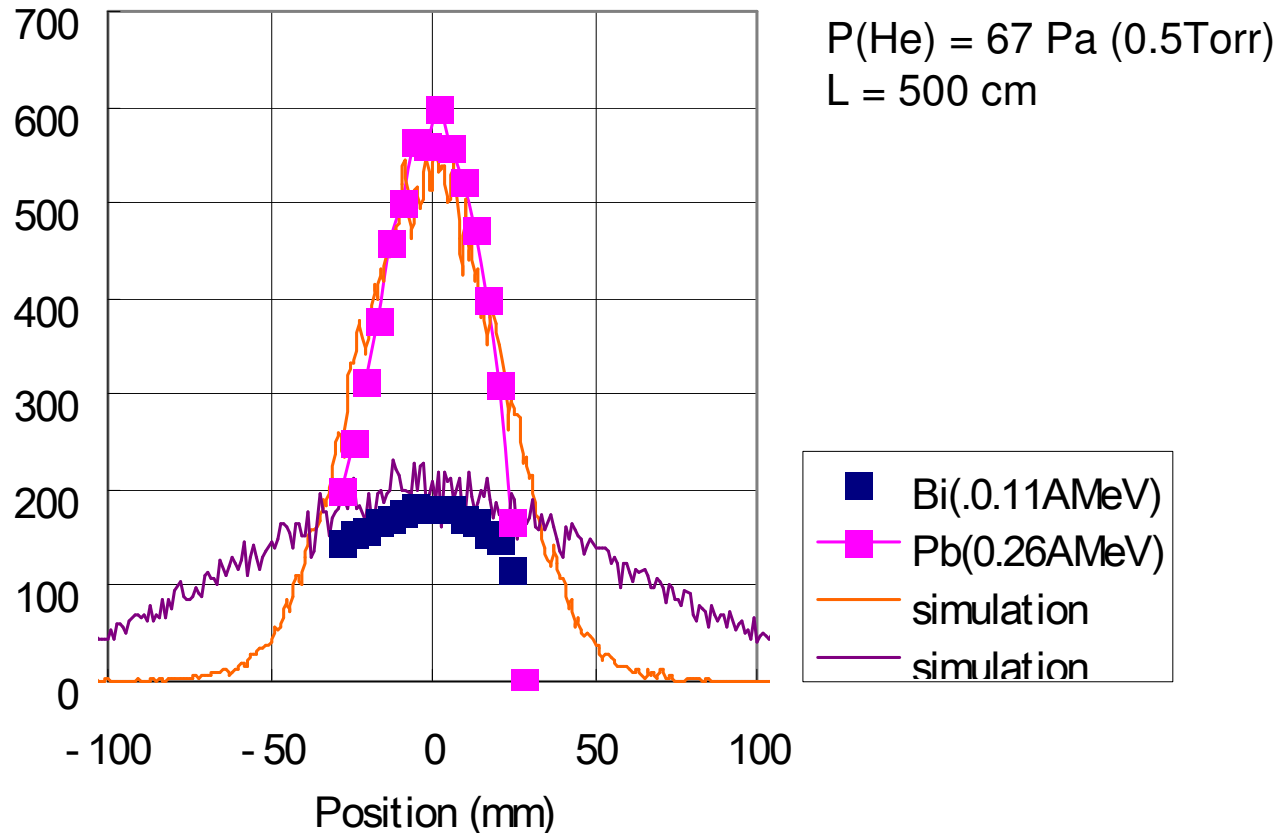
Transmission (efficiency) of GARIS



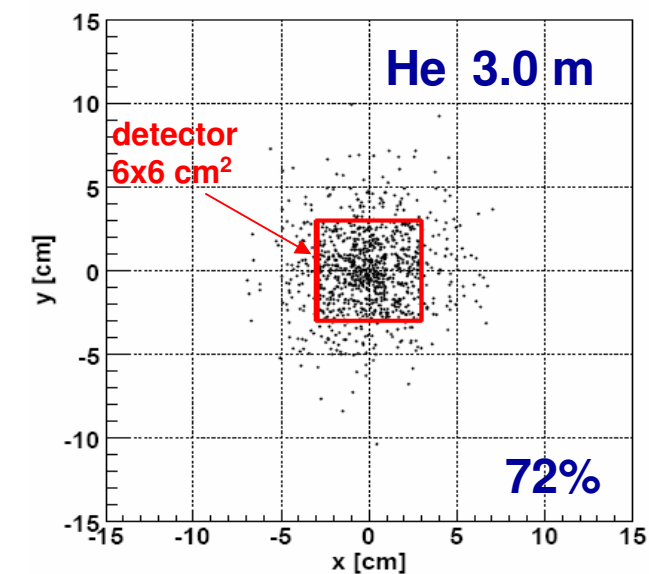
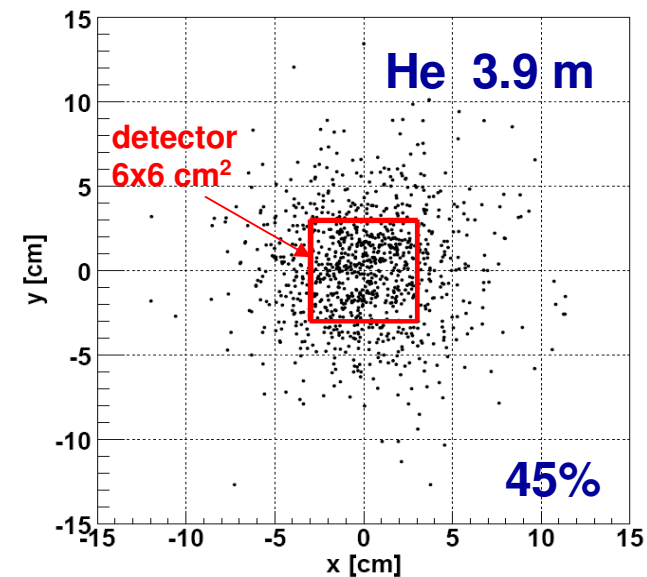
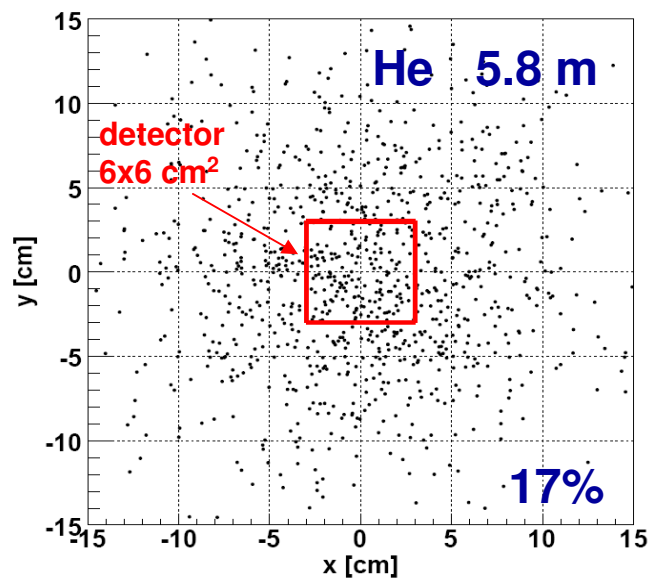
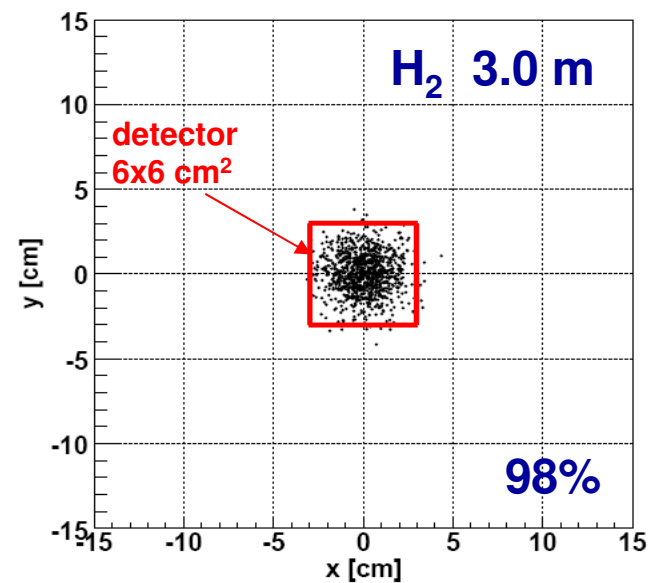
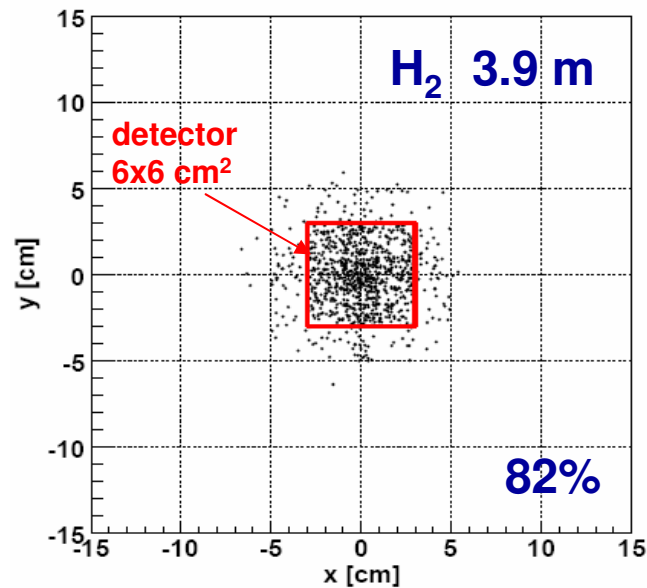
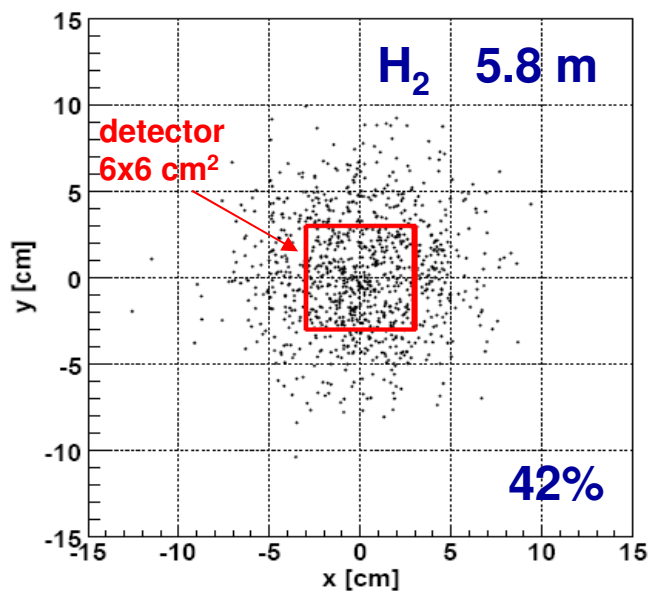
Small efficiency because of slowness of the ion
 multiple scattering with target atoms
 multiple scattering with buffer gas atoms

~ 30%
 ~ 17%

Positional Distribution at Focal Plane



Positional distribution of ^{238}U ions (0.037 MeV/u), $v/v_0=1.22$ at focal plane



calculated by SRIM code (Monte-Carlo simulation) URL: <http://www.srim.org/>

New Recoil Separator Design Concept

High efficiency for slow ($v/v_0 \sim 1.2$) heavy ions

Large angular acceptance ~ 20 msr

Shorter length $\sim < 4$ m

possibility of use of H_2 gas as a buffer gas

Low background at the Focal Plane

special design of beam stopper

second dipole

Limitation

money, space, time

Preparation of devices

RILAC Facility

