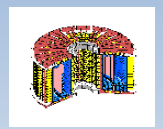

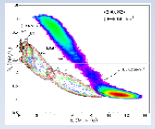

SPIRAL2 WEEK january 2012

RFQ COOLER EXPERIMENTAL RESULTS

STATUS REPORT

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24/01/2012

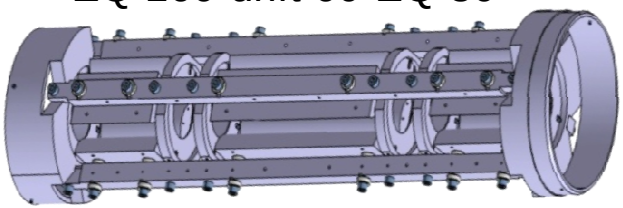
Outline

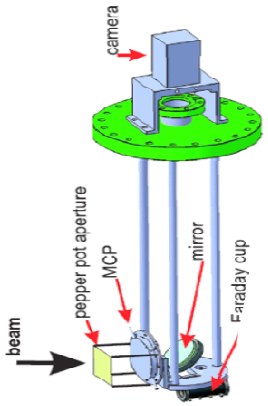
- Utility of RFQ Cooler for DESIR @ SPII
- Recent results:
  - Cooling of low intensity beam (~few tens nA)
  - Cooling of µA beam
  - Longitudinal energy spread & space charge effect
- beam adaptation Cooler/HRS.
- Nuclear environement
- Conclusion and outlook

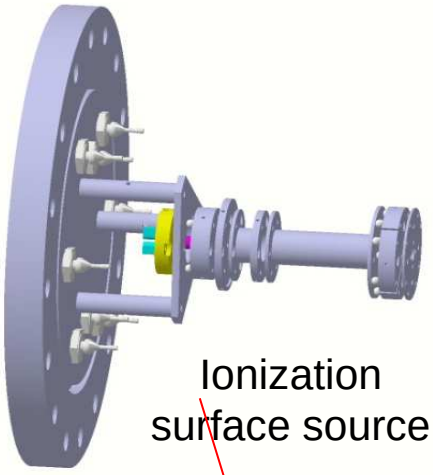
Main equipments & latest modification

Triplet

Configuration:EQ 80-drift 60-EQ 160-drift 60-EQ 80



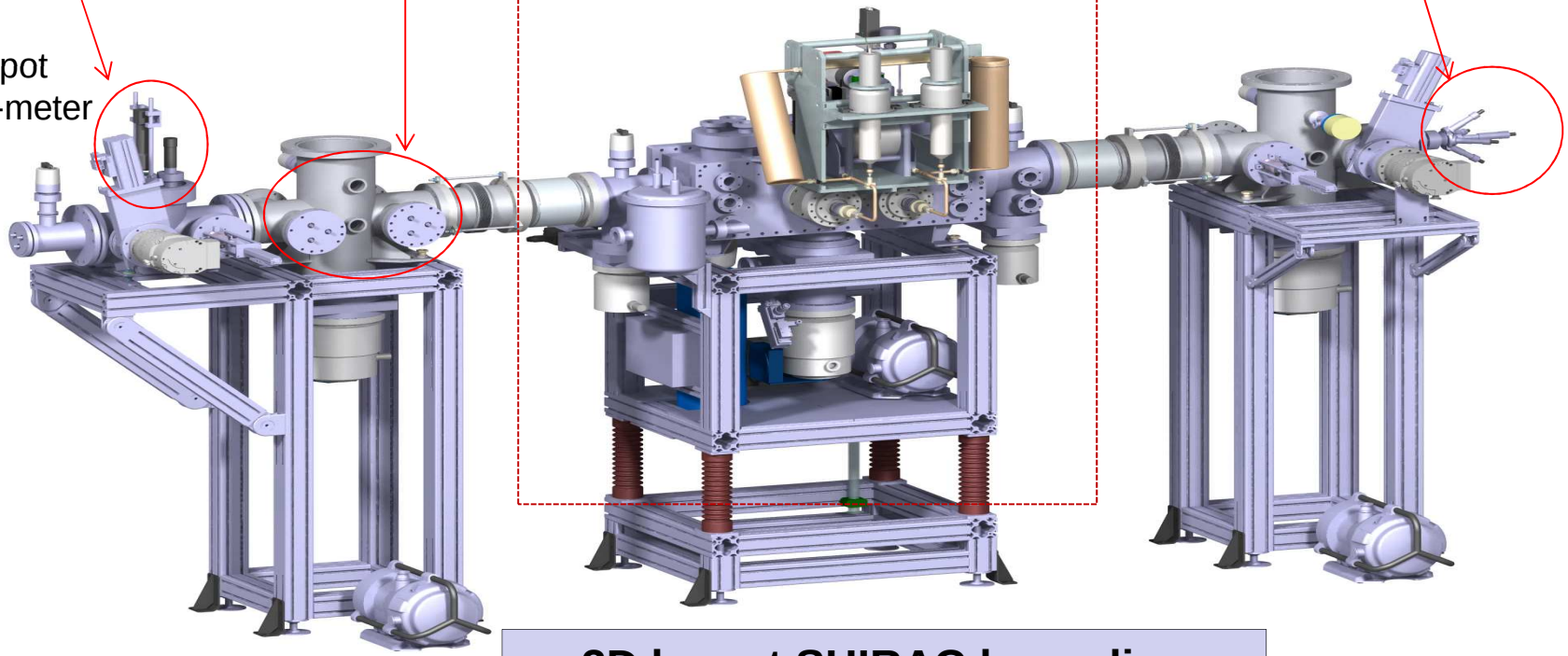




Ionization surface source

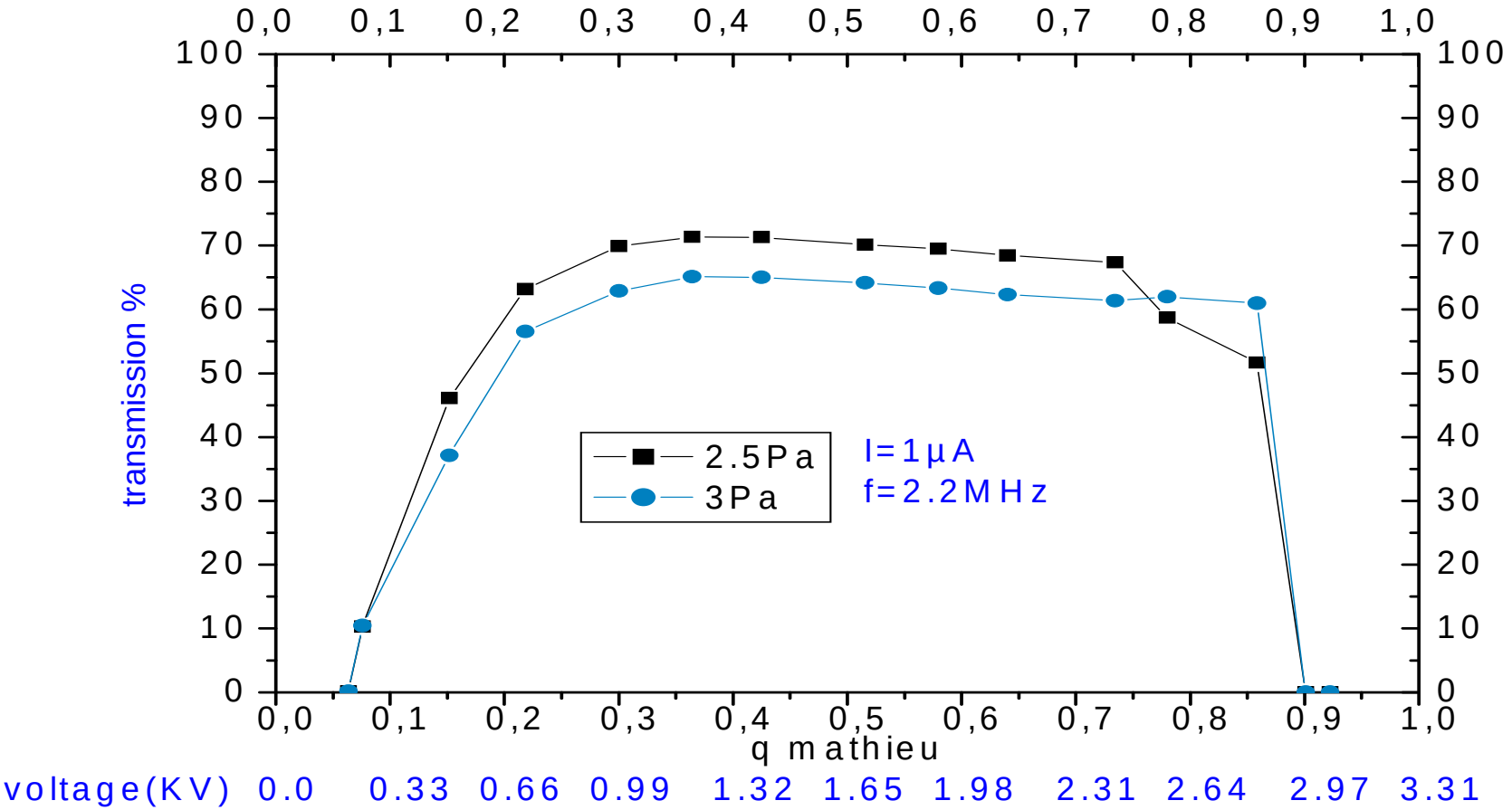
Pepperpot emittance-meter

RFQ:the first and the last segment has been shortened



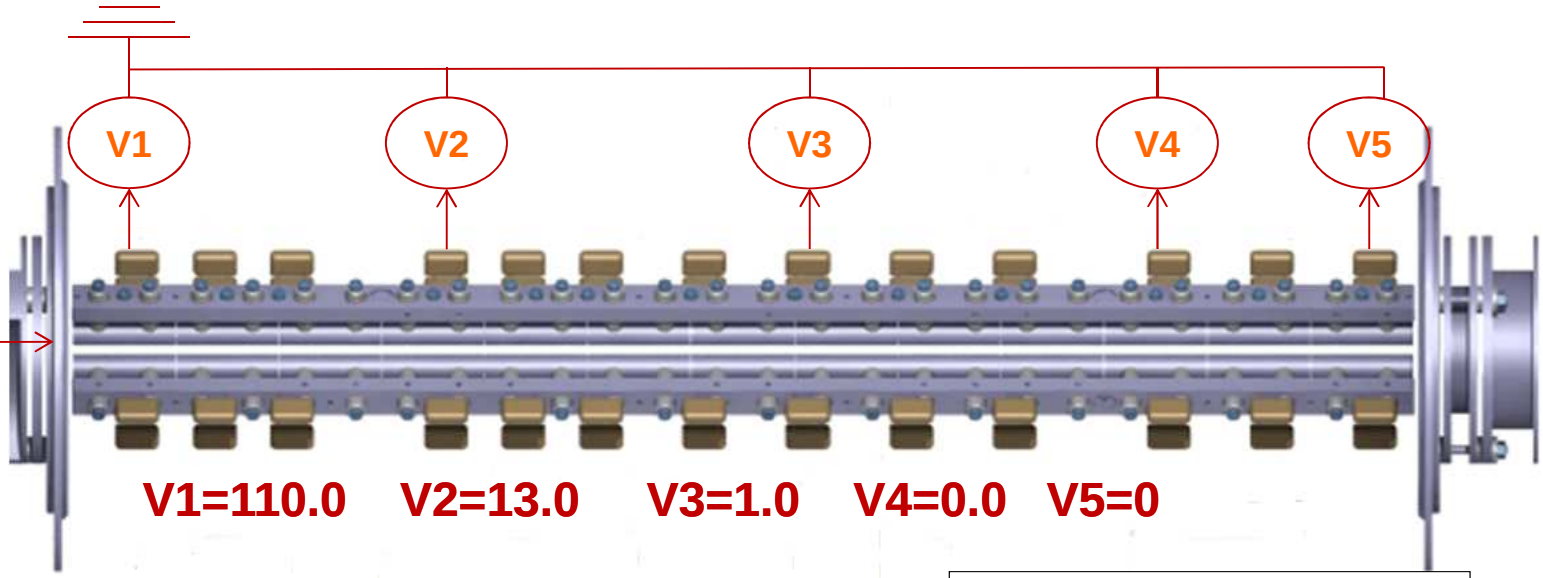
3D layout SHIRAC beam line

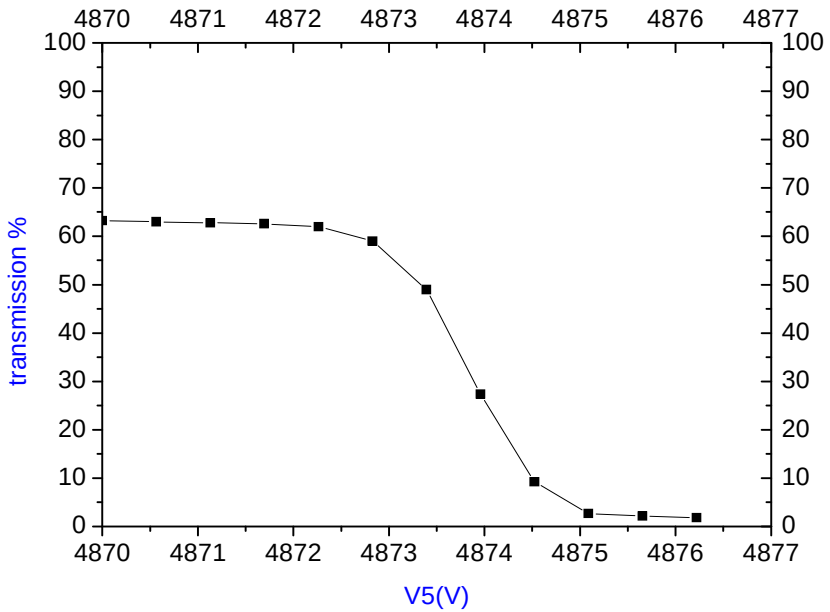
Cooling of µAmps beam of Cs+

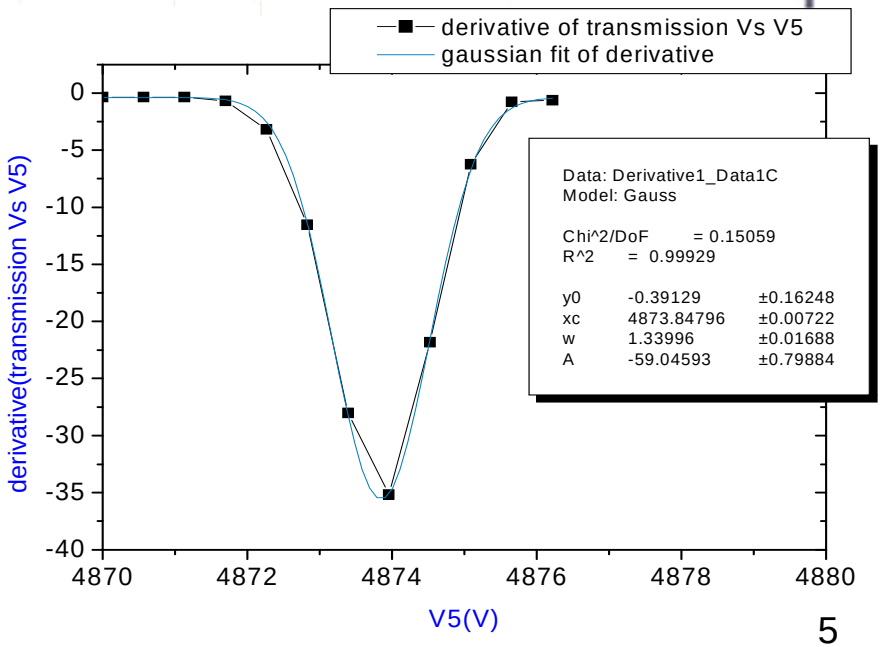


- Transmission is weakly dependent on the frequency:stable
- Transmission ~70% for 2.5 Pa

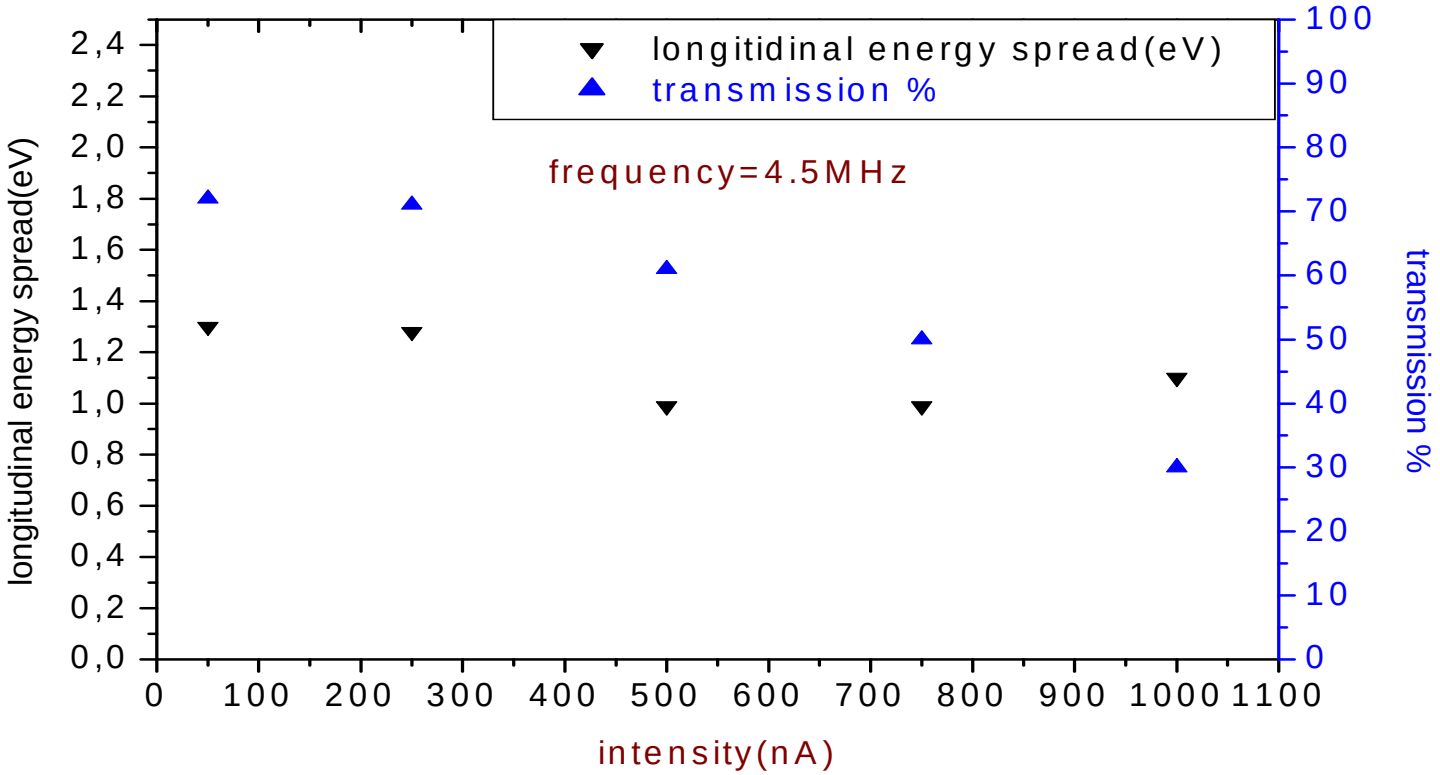
Longitudinal energy spread:method







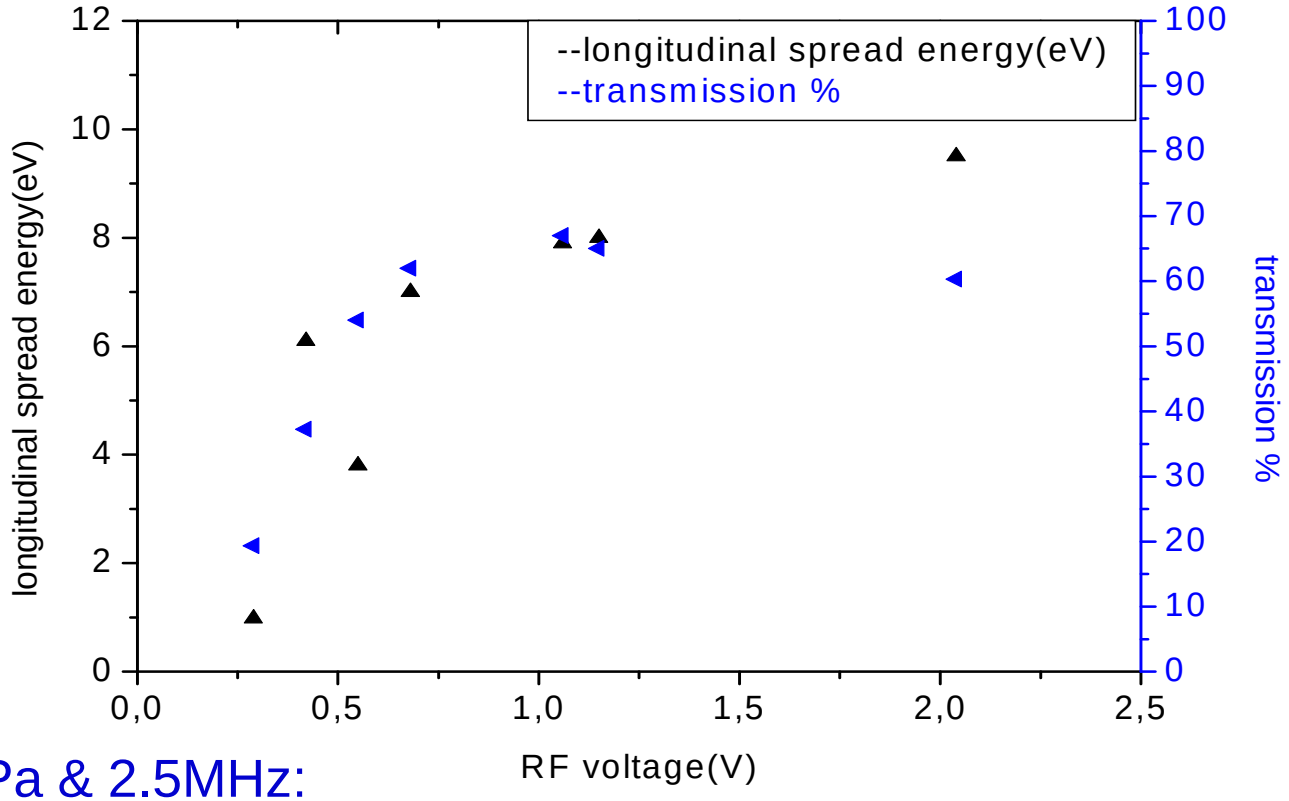
Longitudinal energy spread @ space charge effect



- **intensity <500nA:** Transmission >60% & ΔE~1.3eV
- **intensity >500nA:** Transmission <60% & slight variation of ΔE
- in conclusion, Longitudinal spread energy around 1.3eV
- Best longitudinal spread energy with low RF voltage

Longitudinal energy spread @ 1µA

- RF Effect



@ 1µA , 2.5Pa & 2.5MHz:

- Small ΔE with low RF voltage
- Best ΔE but bad transmission:~1 eV with 20%
- The ΔE depends very much to RF voltage
- The high RF voltage degrades the ΔE

Emittance Measurements

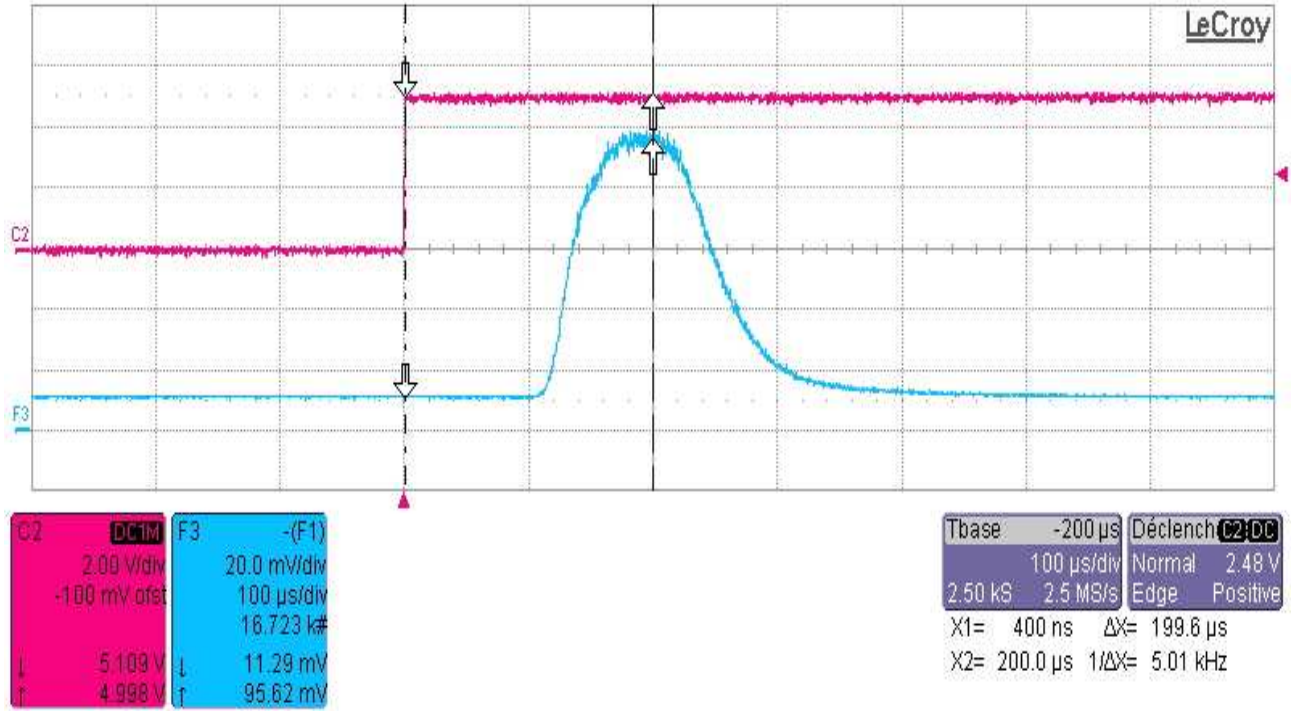
Measurements show out of specs values ~5-10 mmmad

Lower Vrf better results but no measurements

Pepperpot Mask too large

Waiting for a new one…

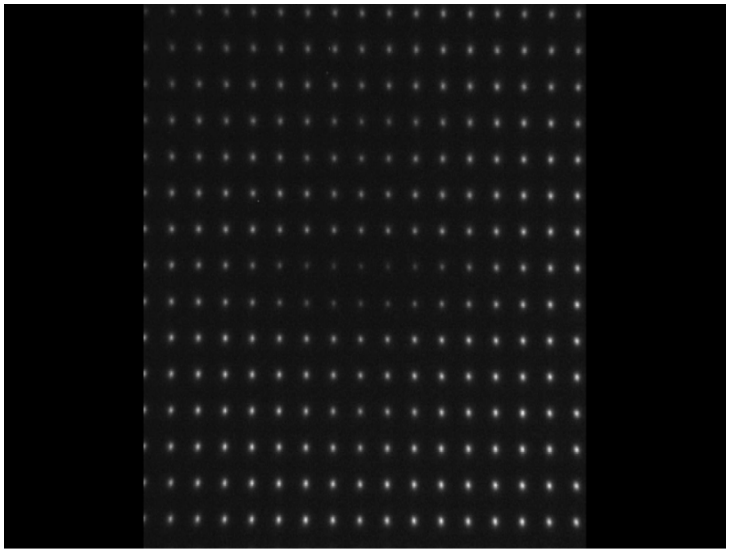
Purity of cooled ions beam



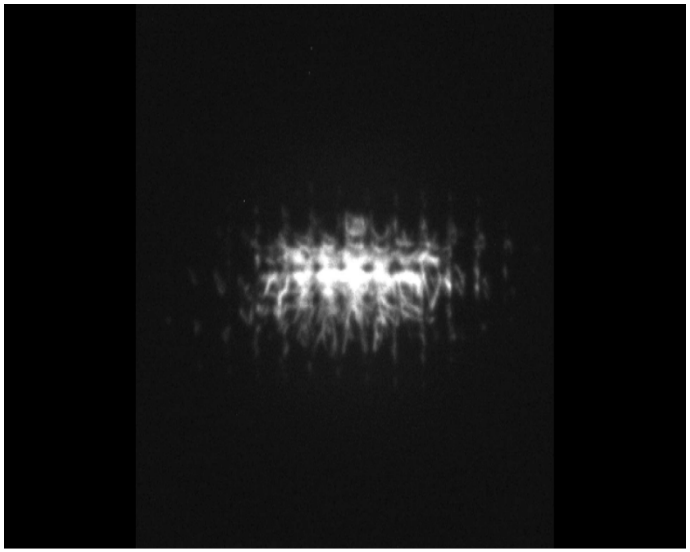
Measurement of TOF of cooled ions

- theoretical TOF=198µs
- experimental TOF=199µs
- the peak m/z=133 correspond to Cs^+

Beam adaptation into a HRS



Effect of TRIPLET

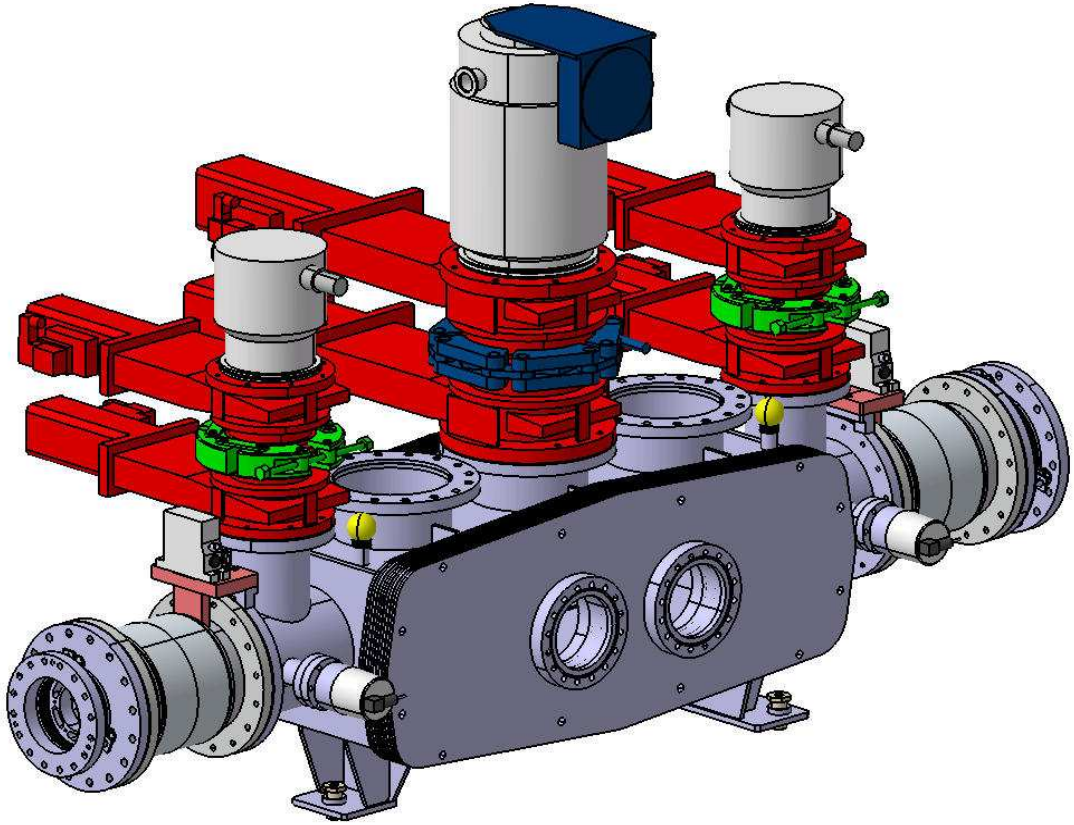


Effect of gas

Requirement of HRS:@ 1µA we can focus a beam into a HRS slit 1*5mm²

Intensity (nA)	Width (mm)	Lenght (mm)
50	0.40	1.06
250	0.55	1.2
500	0.64	1.5
750	0.85	1.7
1000	0.9	2.1

Nuclear environment



To be finalized in may…

Conclusions and outlook

- best µA beam Cooling @2.5Pa & 4.5MHz:

Intensity(µA)	Transmission (%)	Longitudinal ΔE (eV)
<0.5	>60	~1.3
1	30	~1.2
1	>60	3.5

- HRS /Cooler coupling ~OK
- Next measurement: study of others masses.
- emittance: modification of the mask to measure a low emittance
- Nuclearization will be done in spring
- Study of the dependence RF/ΔE