

# **ISCOOL**

## **RFQ cooler installation and commissioning in the ISOLDE hall (build 170)**

List of groups/dept. involved : ATB, PO, CO, AT/VAC, PH, TS,  
SC

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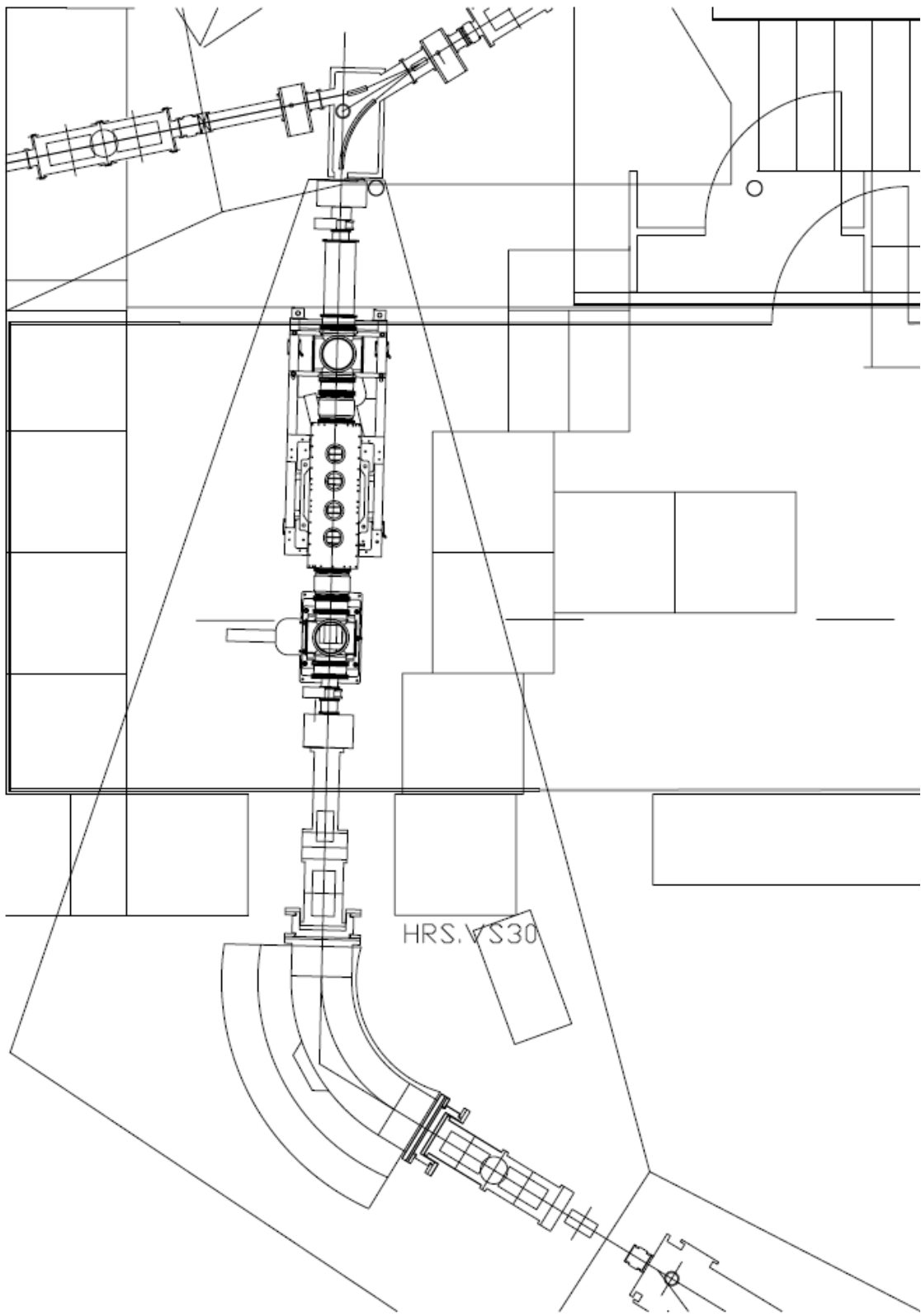


Figure 1: The overall lay-out of the RFQ cooler installed in the ISOLDE hall

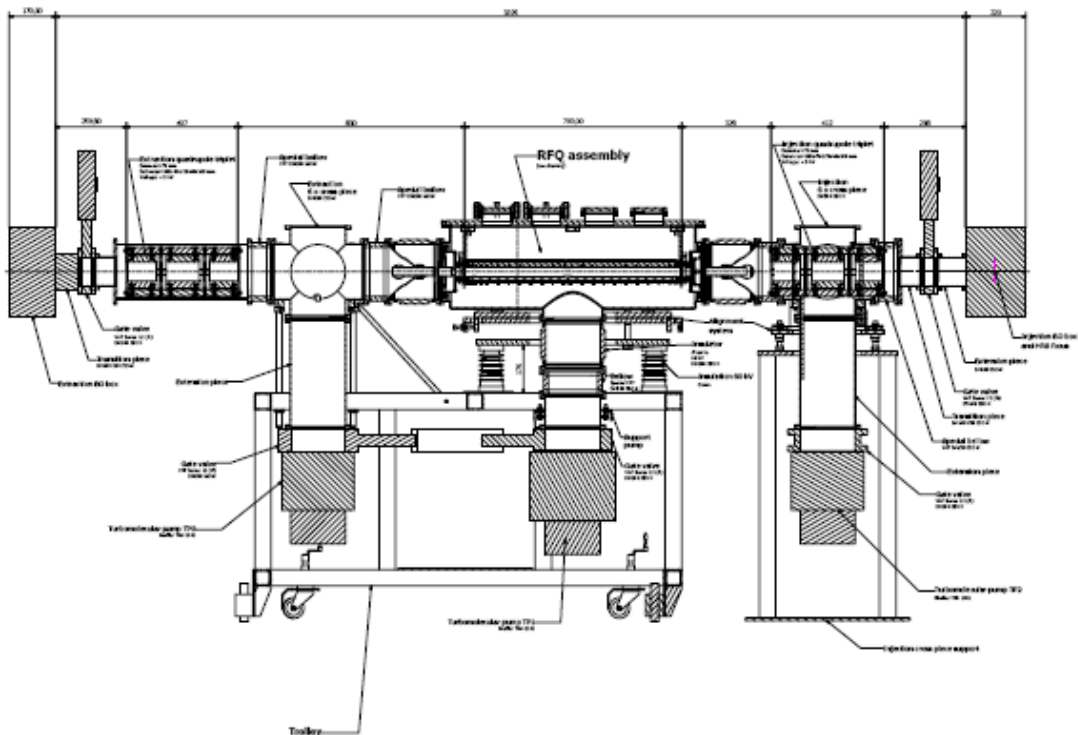


Figure 2: Detailed drawing of RFQ cooler

## 1. Introduction

The ISOLDE RFQ cooler (ISCOOL) will be installed after the HRS separator before the merging switchyard. The cooler will initially be used by COLLAPS and REX-ISOLDE. The cooler should be possible to remove if the efficiency limitation on-line proves to be a problem for other experiments. It should be possible to remove the cooler within a technical stop at HRS of one week. The typical run with the cooler would encompass a single physics run per year at HRS of 3-4 months.

## 2. Off-line tests 2006 (Responsible: Pierre Delahaye)

### 2.1 Target dates

- First beam through the RFQ cooler, 25 July.
- First cooled beam, 25 August
- Parameters to explore: Mass range, efficiency for all masses, transmission for both continuous and bunching mode and longitudinal and transverse emittance.

### 2.2 Target values

- >70% efficiency for Cs, >70% efficiency for K and >20% (10%) efficiency for Li in continuous mode.
- Transmission stable without losses up to 1 nA of current.
- Transverse emittance <math>< 3 \pi \text{ mm mrad}</math> at 60 keV

- Longitudinal emittance: less than 1 microsecond long bunches with an energy spread of 1 V at 60 kV for all ion sources.

## **2.3 HV tests**

- The HV switches for the pulsing of the RFQ cooler must be tested (borrow from Fredrik) and ordered. Ernesto and Pierre will do this.

## **3. Work to be carried out**

### **3.1. Mechanics design and manufacturing of pieces**

#### **3.1.1 Drawings (Responsible: B. Riffaux, TS)**

- The 3D drawing for the triplets are ready since some time back and should be checked for optics consistency by Tim Giles (done).
- The manufacturing drawings for the two triplets, the design of one vacuum chamber for one triplet with support and the design of the pieces to mount one triplet inside a four way cross have been done by Benoit. The detail drawings should be available and sent to the workshops by the end of August.
- The specification drawings for the HV platform positioned next to the RILIS platform together with a drawing for the door closing the RFQ cooler area will be done by TS.
- The detailed drawings for the pump fixations (3 turbo pumps) and the necessary modifications for fitting three valves separating the vacuum chambers from the pumps will be done by TS.
- TS has given beginning of October as an indicative completion date for all these works.

#### **3.1.2 Alignment**

- The "rough" alignment system on the floor for the RFQ trolley must be designed. Mats and Richard will discuss it with Stefano.

#### **3.1.3 Manufacturing (Responsible: P Delahaye)**

- The missing parts have been ordered or will be ordered at CERN. See table below for status.

### **3.2 Vacuum system (Responsible: N. Hilleret, AT-VAC)**

- The vacuum group has requested a new mounting of the turbo pumps. The pumps must be fixed directly to the chassis.
- There is possibly one valve missing to make the RFQ cooler an independent vacuum section. Pierre will check this.
- Mats and Richard have discussed with Noel and Sophie the design of the vacuum system, the mounting of the system on-line and the control issues. The RFQ cooler installation is part of the list of shutdown work in 2006-2007.

### **3.3 HV issues and power supplies (Responsible: J. Parra-Lopez and/or N. David, AB-PO)**

- The RFQ cooler power supply layout has been designed and implemented by the PO group including the low level control hardware (support from Franck Locci). The power supplies for the cooler itself are all used in the off-line set-up.
- The power supplies for the triplets are mostly existing (re-used from existing quads). Pierre and Ernesto will discuss with Nicolas David to assure that all power supplies exists for the installation and that possible spare or missing power supplies are bought and installed.

### **3.4 Instrumentation (Responsible: )**

- The RFQ cooler is mounted between two BO boxes which is should be sufficient for the commissioning.
- A possible compact and on-line emittance meter is under implementation and will at a later stage be implemented on-line. Pierre and Ernesto will discuss with Tim and Gerrit Jan.

### **3.5 Controls (Responsible: )**

- The control system has been discussed in several meetings with the CO group and Ivan and Tim has written a detailed note on it. It is initially sufficient to implement a standard working set with knobs for all elements. The RFQ cooler can be controlled using standard controls but it would eventually be convenient to write an application program. Mats will contact the control group.

### **3.6 Gas system (Responsible: P Delahaye)**

- The mounting of the gas bottle still has to be decided on. A simple setup with the bottle fixed on the chassis should be sufficient.

### **3.7 Installation (Responsible: M. Lindroos)**

- The HV (faraday) cage for the RFQ cooler must be designed and approved by SC. The cage should be ordered as soon as possible. Mats and Richard will discuss it with Stefano.
- An independent HV platform attached to the EBIS platform has been proposed by Julian and Ivan for the power supplies at HV for the RFQ cooler. The platform should be ordered with an external company (possibly) as soon as the specification drawings are available. The SC must agree to the layout and "boris tube" layout. Mats will organize a meeting with SC and PO to agree on a layout.
- The installation of the RFQ cooler will start in December 2007.

## Appendix 1 : Budget for material – status 11.09.2006

Item	Material kCHF	CERN staff FTE- years	In APT	Budget Code	ISOLDE Responsible	Comments
Off-line tests	5	3		T131900 35160	PD	Beam diagnostics: MCP and grids.
Drawings	25.5	-	-	63546	PD	500 hours draftsman TS
Alignment				LPC	PD	“Gabarit” designed and general plan made. <b>To be discussed with TS alignment section</b>
	4			T131900	PD	1 <sup>st</sup> Quadrupole triplet: Delivery 30/10/06
Manufacturing	2			Manchester Mainz U	PD	2 <sup>nd</sup> Quadrupole triplet: Delivery 10/11/06
	6			Manchester	PD	Vacuum tube for 2 <sup>nd</sup> triplet: CERN
	5			T131900	PD	Modification support of pumps: CERN/Mainz?
	5			Manchester	PD	Modification support for 2 <sup>nd</sup> triplet: CERN/Mainz?
Gas system	1			Manchester	PD	Vacuum tubes; small valve. No mass spectrometer.
HV and Power supplies	5			Birmingham	PD	HV feedthroughs
Instrumentation		0.05	No			Re-using existing equipment
Vacuum system	5	0.05	No			Section valves (2) PLC hardware: To be discussed with David Porret
Controls		0.05	No			
Faraday cage and HV platform	25				PD, ML	
Interlock system	5				ML	To be discussed with TS
Installation					ML	
<b>Total 2006</b>	33+25.5					19kCHF still available UK grant, 14kCHF from T131900, 25.5 from 63546
<b>Total 2007</b>	35					To be funded

Figure 1: Overall plan for RFQ cooler installation

