

Preparation of FP7 Integration Activity Bid (2008)

Superconducting RF Acceleration Systems (SRFAS)

ESGARD Audition, 5 December 2006

- 1. Status at CARE'06, Frascati**
- 2. Corrective Actions**
- 3. Preparatory Work for the 1st WG meeting on December 19, at LAL-Orsay**
- 4. Is my strategy OK with ESGARD ?**

Preparation of FP7 Integration Activity Bid (2008)

Superconducting RF Acceleration Systems (SRFAS)

Preparatory Group (13 people):

Initial group : Dieter Proch (DESY), Terry Garvey (IN2P3), Trevor Linnecar (CERN), Olivier Brunner (CERN), François Richard (IN2P3), Vittorio Palladino (INFN), Olivier Napoly (CEA)

By extension : Carlo Pagani (INFN), *Stéphane Chel (CEA, group 1)*, Peter Mac Intosh (CCLRC), Rebecca Seviour (CCLRC), Thomas Schilcher (PSI), Mariusz Grecki (Polish Universities), Susanna Guidicci (INFN)

Tentative Milestones (backward in time) from Roy

EC IA Call

Closing : March 2008

Opening : January 2008

Beginning of Write Up : Fall 2007

Decision on number of I3 : Summer 2007

Selection + Priority of R&D Items : Spring 2007

First meeting of the 3 PGps at CERN 30-10-2006

First Meeting of the SCRF-AS Group : 18-21 december (??)

Plan of Progress

- Identify Interested Parties
- Identify all Research Programs from “Inputs”
- Identify Boundary Conditions
- Identify Infrastructures
- *Identify JRA and TNA structures (not shown in Frascati)*
- Prioritize R&D Items :
 - High : high scientific value, fully in ESGARD
 - Medium : high scientific value, not fully in ESGARD
 - Low : low scientific value as R&D item, or not in ESGARD
- Evaluate total Budget Requested
- Cut programs when total EC Budget is known
- First Draft of SCRF Integrated Activity Project Plan

Interested Parties

- CARE-SRF + CARE-HIPPI-WP2
collaborators : CERN, DESY, Poland, CEA-
IN2P3, INFN (*Frascati, Legnaro, Milano*),
PSI,...
- CARE-PHIN Collaborators : *Rossendorf*,...
- UK labs
- BESSY and FEL labs
- ...

Inputs

- ESGARD LoIs:
 - Generic SCRF R&D
 - Lead photocathode x2
 - Thin film technology
 - Slope Cryogenics
 - Sputtered SC QW cavities
 - EU-SCRF @ CERN
- Laboratories
 - CERN >
 - DESY >
 - UK (Daresbury + Liverpool + CI) >
 - LASA Milano >
 - *LNF + LNL (not in Frascati)*
 - CEA >
 - IPN Orsay >
 - LAL Orsay >
 - Poland >
 - **Rossendorf >**
- Nu-Fact DS < 200 MHz
SC cavity for μ acceleration

Boundary Conditions

- 1) Proton SCRF R&D in Group “Protons”
- 2) CW SC RF Gun in Group “Novel techniques”
- 3) ILC-GDE R&D Board recommendations
- 4) CNI Proposal for an EU-SCRF Facility

https://ab-div.web.cern.ch/ab-div/Info/2006/SCRF_WebSite/index.htm

3 possible cases (status known in spring 2007):

- a) Full blown facility accepted by EC
 - b) Gradual upgraded facility starting from existing at CERN
 - c) No EU-SCRF Facility
- 5) EURO-FEL Community Plans + ERL
 - 6) Scientific activities to start only in 2009 !!!

Existing Infrastructures

https://ab-div.web.cern.ch/ab-div/Info/2006/SCRF_WebSite/index.htm

SC RF Accelerator :

- FLASH linac (30% beam time to SC Acc Dvltps)

Test Facilities :

- CERN existing infrastructures (SM18,...)
- DESY Hall 3 (CHECHIA, CMTB, ...)
- SUPRATECH (Saclay-IPN Orsay-LAL Orsay)
(CryHoLab, EP, coupler test stand, ...)
- LASA-Milan (vertical test)
- Daresbury (vertical test stand, couplers,...)

Inputs : ESGARD Letters of Intent

Subject	Type	Title	Nb institute	Duration	Cost (Meuro)	Contact	
1	SCRF	JRA-WP	Deposition of thin superconducting layers for accelerator technology	3	5	2	M. Sadowski (IPJ)
2	SCRF	JRA-WP	Deposition of superconducting films of pure lead (Pb) by means of the UHV cathodic arc	3	5	0.5	J. Langner (IPJ)
3	SCRF	JRA-WP	Development of various materials (e.g. Mg, Pb) films on Cu substrates, by means of UHV-cathodic-arc, to be used as photocathodes in advanced RF photoinjectors	2	4	?	F. Tazzioli (LNF)
4	SCRF	JRA	SCRF technologies	SRF coll.	?	?	D. Proch (DESY)
5	SCRF	JRA	SC Sputtered Quarter Wave Cavities	6	3	3	M.Pasini, M.Lindroos (CERN)
6	SCRF	JRA	General purpose infrastructure at CERN for test of SC RF cavities and cryomodules	SCRF coll.	4	9.6	W.Weingarten (CERN)
7	SCRF	JRA	Influence of Slope on Superconductive RF Cavity Cooling	2	2	0.9	B. Rousset (CEA)

Inputs : SCRF Infrastructure at CERN

Subject	Type	Title	Nb institute	Duration	Cost (Meuro)	Contact	
6	SCRF	JRA	General purpose infrastructure at CERN for test of SC RF cavities and cryomodules	SCRF coll.	4	9.6	W.Weingarten (CERN)

1. A central initiative, its multipurpose character is welcomed.
2. Warning : it can be justified in the I3 only if it is largely motivated and used by the other R&D programmes included in this I3.
3. Need to analyze in depths the proposal, in particular the role and the RF test facility upgrades in the other EU laboratories

Inputs : Thin Films

“Thin Films” R&D Items appear five times:

Lol 1 : Nb arc discharge deposition on SC cavities , continuation of SRF/WP4

Lol 2 : Pb / Cu deposition for CW RF Gun Photocathode, with arc discharge

Lol 3 : idem, + Mb / Cu

Lol 4 / WP4 “Fundamental Research”: investigation of A15 materials for SC RF cavities (e.g. V3Sn, Mo-Re, Nb3Al,...) + RF investigation of high Tc materials

Lol 5 : Prototypes (101 MHz , $\beta=4.5\%$, 7.6% and 12.1%) of Sputtered QW Resonator (Legnaro technique) for RIB (Rex-Isolde, EURISOL)

My preliminary recommendations, to be discussed in the group:

1) Merge Lol2 + Lol3, ranked High or Medium

2) Merge Lol1 and Lol4/WP4, ranked High

3) Rank Lol 5 Medium

Inputs : DESY

	Work package (WP)	Collaborating Countries	Integral of FTEs	Estimated Costs [k€]	My Comments
1	Superconducting RF gun	Germany, Italy, Poland, USA	2	710	High or Medium
2	CW operating transmitter	Germany, USA	2	800	High or Medium
3	LLRF controls	Germany, Poland, Italy, France, Switzerland	58	2590	High (de scoping)
4	Timing & synchronization for SC FEL	Germany, UK, Turkey	20	2200	Low
5	Large grain / single crystal Nb resonators	Germany, USA	?	500	High
6	Improvement of the 3.9 GHz higher harmonic system	Germany, USA	6	1360	Low
7	"LOLA" at 3 GHz-Longitudinal bunch phase-space measurements	Germany, USA	6	210	Low
8	HOM beam monitors	Germany, France, UK, USA, Japan	6	1620	High
	Total (Preliminary Status) 5 December 2006	O. Napolj. at ESGARD	~7000 k€	9990	12

Inputs : UK – ILC Crab Cavity

Workpackage	Implementation	Responsible Person	Collaborating Countries	Collaborating Institutions	FTE (SY)	Cost (k€)
LLRF Controls for Crab Cavity	ILC	A Dextor (Cockcroft Institute)	UK, USA, Germany	CCLRC, Cockcroft Institute, FNAL, DESY	4	450
Low microphonics crab cavity cryomodule	ILC	S Pattalwar (CCLRC)	UK, USA, Italy (?)	CCLRC, Cockcroft Institute, FNAL, INFN(?)	6	550
HOM, SOM, LOM and input coupler development for crab cavity	ILC	P McIntosh (CCLRC)	UK, USA, Germany	CCLRC, Cockcroft Institute, FNAL, SLAC, DESY	6	600
Crab cavity tuner development	ILC	G Burt (Cockcroft Institute)	UK, USA, Italy(?)	CCLRC, Cockcroft Institute, FNAL, INFN	2	300

Inputs : UK - ERL

Workpackage	Implementation	Responsible Person	Collaborating Countries	Collaborating Institutions	FTE (SY)	Cost (k€)
CW accelerating module for ERL applications	ERL based light sources	P McIntosh (CCLRC)	UK, USA, Germany	CCLRC, Cockcroft Institute, Cornell, LBNL, FZR Rossendorf	8	1200
LLRF controls for ERL accelerators (~ DESY #3)	ERL based light sources	A Moss (CCLRC)	UK, USA, Germany	CCLRC, Cockcroft Institute, JLab, FZR Rossendorf	4	500
High power CW input coupler (>20 kW) (~ DESY # 2)	ERL based light sources	C Beard (CCLRC)	UK, USA, Germany	CCLRC, Cockcroft Institute, Cornell, FZR Rossendorf, BESSY	6	400

Inputs : CEA–Saclay

Workpackage	Implementation	Lab	Collaborating Institutions	FTE (SY)	Cost (k€)	My Comment
EP on single cell cavity and RF tests	ILC	CEA - Saclay	DESY, KEK	?	?	high
Piezo tuner test @ 35 MV/m	ILC FLASH	CEA - Saclay	DESY, LAL	?	?	High
Cold BPM with high resolution	ILC FLASH	CEA - Saclay	DESY	?	?	High
Prototype $\beta=0.65$ proton cavities + 1MW pulsed RF tests	SPL	CEA - Saclay	CERN	?	?	“Protons”
Piezo Tuners for $\beta=0.65$ proton cavities	SPL	CEA - Saclay	CERN	?	?	“Protons”
SPL cryomodule	SPL	CEA - Saclay	CERN	?	?	“Protons”

Inputs : IN2P3 Orsay

Workpackage	Implementation	Lab	Collaborating Institutions	FTE (SY)	Cost (k€)	My Comment
Upgrade of Coupler test stand	ILC FLASH	LAL-Orsay		?	?	High
Integrated CryHoLab RF tests	ILC FLASH	CEA-Saclay LAL-Orsay	DESY, KEK EU SCRF	?	?	High
Prototype 4-gap Spoke cavity (LINAC4)	SPL-Linac4	IPN-Orsay		?	?	"Protons"
Thin film Charaterization	ILC	IPN-Orsay		?	?	High

Inputs : LASA Milano

Workpackage	Implementation	Lab	Collaborating Institutions	FTE (SY)	Cost (k€)	My Comment
Co-axial Blade Piezo-Tuners	ILC FLASH	LASA	FNAL	?	?	High
End Groups (welding, flanges)	ILC FLASH	LASA	FNAL CEA (?)	?	?	High

Input: FZR Rossendorf-ELBE + INFN LNF + CI

Tasks

1. Emittance Improvement
 - 1.1. Laser pulse shaping and phase noise reduction
 - 1.2. RF cavity advancement for higher gradient operation—fabrication of a large grain Nb cavity
 - 1.3. Investigation of different emittance compensation methods - external solenoid field, cathode positioning and shaping, operation with additional TE-mode RF field
2. Test of alternative and advanced photo cathodes
Photocathodes with higher Q.E., GaAs photocathodes for polarized electrons
3. Conceptional and experimental studies concerning the application of SRF photoinjectors for the production of polarized electrons, and for the Compton-back-scattering polarized positron generation.

Input: FZR Rossendorf-ELBE

Collaboration

Tasks	Topic	Collaboration
1.1	Pulse shaping	MBI Berlin (D), University Milan (I), INFN Frascati (I)
1.2	Large grain cavity	ACCEL GmbH (D), DESY Hamburg (D)
1.3	Emittance compensation	CCLRC Daresbury (UK), INFN Frascati (I)
2.	Photocathodes	INFN Milan (I), SLAC (USA)
3.	Studies	http://www-project.slac.stanford.edu/ilc/acceldev/injector/elec_sources.html

Cost estimation

	FZD Rossendorf (FC)	Collaborators
Man power	45 PM 150 k€	150 k€
Consumables	100 k€	100 k€
Durables	150 k€	-

Total: 650 k€

Next Steps

COSTING:

- Cost the un-costed items
- Prioritize - Rescope the R&D items
- Calculate the Total costs in the 3 categories High, Medium and Low
- Top the total cost to 45 M€ (?)

DOCUMENTATION

- Produce short texts in support of the retained items

ORGANISATION

- Define the Trans National Access infrastructures
- Define the Networking Architecture

2) Corrective Actions

BETTER PERCEPTION of INFN ACTIVITIES

- Invite Susanna Guiducci to join the SRFAS Working Group
- Include LNF (Frascati) and LNL (Legnaro) in the Interested Parties
- Contact made by e-mail with Enzo Palmieri, who confirmed his interest on several fields

3) Preparatory Work for the 1st WG Meeting

- 1) Duration of the activities
- 2) Integrate LLRF activities (action M. Grecki, T; Schilcher)
- 3) Integrate Thin Film activities (action O. Napoly)
- 4) Identify future R&D Tasks for the ILC (action T. Garvey)
- 5) 'SCRF infrastructure at CERN' : agenda of proton cavity developments, connection with internal IA R&D programmes, distribution of EU funds over partners (action T. Linnecar, O. Brunner)
- 6) Cost French and Italian R&D Items (action C. Pagani, O. Napoly)

Agenda of the Meeting

19 December 2006 at LAL-Orsay

- 1) Report from the ESGARD meeting (5 December 2006)
- 2) Short status of the CNI Project
- 3) Status Reports on the topics 1 to 6 listed under "Preparation of the Next Meeting" in the mail below.
- 4) Discussion on the Working Group strategy, including first thoughts about the JRA, TNA and NA structures.

4) SRFAS Strategy (1/2)

Remarks / Criticisms from a WG member:

Present approach does not respect the “rules”:

- Formulate programmes only through Lols
- Do not accept post-deadline Lols (are the late laboratories really motivated ?)
- Unequal treatments between SRFAS parties
- Unequal treatments between the 3 IA WGs

4) SRFAS Strategy (2/2)

My approach:

- The MAIN rule is
 - build a programme for research in 2009-2011, with a bid in March 2008
 - to federate laboratories around SCRF Activities
- ⇒ Go slowly to avoid mistake and exclude some (CW RF Gun)
- ⇒ Deadline in 2006 is too early
- It is mandatory to take into account
 - Existing SCRF R&D programmes
 - CNI bid for New SCRF Infrastructure
 - ILC-GDE call for R&D Tasks