Revised SPL-study work-plan

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R & D for a high power SPL
(1/3)

Scenario 2

Motivation

- Preserve potential for some alternative physics programmes (Neutrinos, RIB)
- Preserve possibility of new injectors at long term (e.g. DLHC option…)
- Update CERN competences in superconducting RF
- Synergy with other applications outside of CERN

Description

- Focused on high beam power
- R & D only (no work on integration / civil engineering / environmental impact)

R & D for a high power SPL
(2/3)

Proposed subjects until 2015
(in continuity with the work done for the LP-SPL)

Scenario 2

- R & D towards a high duty cycle H^- source
- Study of the optimum high power RF architecture for a high power SPL
- Design, construction and test of superconducting RF cavities (704 MHz – 5 cells – β=1)
- Development of high power RF coupler, HOM damper and adaptation of tuner
- Upgrade of the SM18 test place [2 K cooling + pulsed RF source at 704 MHz (1 MW @ 50 Hz)]
- Pulsed high power RF tests of contiguous cavities in a single cryostat
- Design, construction and test a high power klystron modulator
- Design, construction and test of a prototype cryomodule equipped with 8 β=1 cavities

R & D for a high power SPL
(3/3)

Preparation & implementation procedures

- Presentation of proposal on April 14 to the CERN management (L.M.C. meeting)
- Integration in the “Medium Term Plan” (2011-2015) to be submitted to the SPC (May) and the CERN Council (June)

Scenario 2

- Tentative planning:
  - First half of 2013: high power test of 4 sc cavities in a cryostat
  - 2015: high power test of 8 sc cavities in a prototype full size cryomodule
  - >2015 - Reminder: preparing a project proposal require work (> 2 years) on integration, safety, civil engineering design and the realization of an impact study

In-phase with ESS design update

Revised tentative planning

1/04/2010
R. Garoby

PLANNING AND DELIVERABLES OF THE R & D FOR A HIGH POWER SPL

	2011				2012				2013				2014				2015			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
SM18 - 2K Cryogenics			V cryo.					X												
SM18 modulator								1*								2*				
SM18 - 704 MHz High Power RF								X												
High Power RF couplers	4			>4								>8								
Superconducting cavities				>4								>8								
Assembled string of 4 cavities						X														
Test cryostat (4 cavities)						X														
Equipped test cryostat								X												
High power RF tests in test cryo.										X										
Assembled string of 8 cavities														X						
8 cavities cryomodule														X						
Equipped cryomodule																X				
High power RF tests in full CM																		X		

* Modulator 1: Scandinova Modulator 2: CERN

Any consequences for external labs?

- FP 7 - Eucard (Grant agreement no. 227579)
  - Networking activities
    - Work Package 4: Accelerator Science Networks: EuroLumi and RFTech
  - Joint Research activities
    - Work Package 10: Superconducting RF technology for proton accelerators and electron linear accelerators
      - Task 2. SC Cavities for Proton Linacs, Electro-polishing and surface investigations.

        Design and fabrication of two β = 1 ; 5-cell 704 MHz elliptical cavities (if budget frame sufficient)

        Sub-task 2: Design and fabrication of β = 1; 704 MHz elliptical cavity. Preparation of the cavity and assembly in clean room. Development of a vertical EP bench and upgrade of HPR and field-flatness set-ups suited to the cavity size and weight. This sub-task is under responsibility of CEA-DSM-Saclay. The cavity interfaces with a cryomodule will be studied with CERN.
- FP 7 - SLHC-pp [1] (Grant agreement no. 212114)
  - WP RF systems
    - Study of field stabilization in pulsed mode
    - Power test of RF system at CEA-Saclay 704 MHz test stand

[1] Large Hadron Collider upgrade - preparatory phase

Any consequences for external labs? (2)

- "Contribution de la France au CERN"
  - Design and procurement of 2 helium vessels for β = 1 cavities
  - Fabrication and procurement of 8 (+1) tuners for β = 1 cavities
  - 3D model of a 704 MHz 1 MW power coupler for elliptical cavities qualified at CEA-Saclay (√)
  - 3D model of a active frequency tuner for 704 MHz elliptical cavities (√)
  - Required new or upgraded equipment:
    - Construction of vertical EP station
    - Modification of set-up for field flatness tuning
    - Modification of high pressure water rinsing system
    - Modification of vertical insert of cryostat
- BMBF German Universities (Rostock, Darmstadt, …)
  - electromagnetic simulations and diagnostics[1]

[1] to be confirmed