WG2 - Summary Report
Follow up of objectives for the meeting

1. Information of WG2 partners

2. Check of baseline design

Power coupler

Tolerances of Q_{ext} for Power coupler

Position: vertical at top, clean room assembling with coupler in horizontal position

HOM coupler

The HOM coupler requirements not precisely known, 2 HOM couplers ports are recommended on each side of the cavity in spite of the more complicated mechanical layout. Are dipole modes really important?

$Q_{ext} < 10^7$ (in case of chopping $Q_{ext} < 10^5$)

Cryogenics

Evaluation needed of RF dissipation at 1.7 - 2.0 K for optimization of cryo-layout, including bellows, power coupler, etc.

Mechanical issues

Tolerances to mechanical loads (also for unsupported cavity under vacuum); e.g. for safety certification (2 bar 300 K, 4 bar 2.0 K)

Definition of cavity flanges diameter and length in between required

The Saclay design (bare cavity) complies with the requirements of the LP-SPL $\beta = 1$ cavities (however with constraints in chopping possibilities)

3. Missing items/devices/facilities/simulations

Preparation and surface treatment

Need for recipe for high gradient cavity: XFEL is baseline: EP; it is considered mandatory to break the cavity vacuum exclusively in clean room class 10

Computer simulations

Mechanical + electrical + thermal

- Lorentz-force detuning
- Exhaustive list of different load cases of cavity/He-tank (including quench, etc.)
- Heat loads to SS bellows due to power coupler
- Transversal kick to beam of power coupler (compensation at opposite position needed?)
- Determine loss factor of taper

Electron activity

Multipactor in end groups plus taper, power coupler and dark current in cavity chain

Ambient magnetic field

Simulation of Cryoperm/Mumetal shield in good progress

Newly identified Hardware needs

Coupler test place – in discussion with CEA

Copper model of cavity (bead-pull possibility, HOM identification and damping, mechanical tolerances, mechanical mode excitation and transfer function …)

Optical inspection, image processing software and repair equipment

The "Oscillating Superleak Transducers (OST)" could replace the temperature mapping equipment, if quench location shall be identified

Radiation monitors for on-line measurement, Gamma spectrometer

4. Compatibility of LP-SPL "base-line" with HP-SPL or other project studies

Further comprehensive computer simulations are needed.

5. Contribution and deadlines

Manufacturing issues

8 tuners + 1 spare for study, CEA-Saclay; design adaptation by CERN with aid of CEA

6. Coordination issues (participants - information exchange policy – archiving)

MoU was (is) provided to participants

Royal Holloway London intents to participate (define contribution)

Web site - archive

Periodic meetings

From common session on Thursday

Use most recent data on SNS cavities for Q_0 - prediction

Increase iris diameter of $\beta = 0.65$ to obtain 1.5 % cell to cell coupling

General remark

Separate Demonstrator design and manufacture (due 2012) from SPL project issues, as recommended in the Mechanical Issues Workshop conclusions.

We appreciate the arrival of new collaborators in our WG.

S. Chel, W. Weingarten

Meyrin, 12 Nov 2009

Supplement and future works (for discussion)

Prioritized list

HOM absorber/coupler

Determine by simulation the external Q for the most “dangerous” HOMs for the “baseline” cavity, including the taper and bellows (SS or copper), and the 2 beam tube ports equipped with a coaxial antenna providing $Q_{ext} = 10^{12}$.

Computer simulations

Start with computer simulations of electron trajectories and assess the multipactor characteristics for the “baseline” cavity end group (larger beam tube, taper, smaller beam tube)

Cryogenics

Determine heat dissipation in cavity (2.0 K) and bellows

General

Organize periodic meetings of WG2

(proposal: by video transmission every 4 weeks, starting Monday, 11 January 2010, 16h00 CET; venues to different partners 2 times per year)