COMPARISON OF PARAMETERS FOR THE (LP)SPL

CROGENICS CONSIDERATIONS

Subject	Frequency	Temperature
Cryostat design	**Power dissipation per cavity in the SPL in pulsed operation is by 1 – 2 orders of magnitude smaller than for the LEP cavities in CW operation. Therefore, design considerations for the LEP cryostat could provide valuable guidelines in addition to other designs.**	
	The temperature increase at the Nb-He interface is significantly reduced compared to CW for pulsed operation (< 1 msec pulse length).	

COMPARISON OF PARAMETERS FOR THE (LP)SPL

SC CAVITIES GRADIENT, Q ETC.

Subject	Frequency	Temperature
Comparison $\beta = 1$ and $\beta < 1$ cavities	**$\beta < 1$ cavities are inherently lower in gradient, compared to $\beta = 1$ cavities, because of** **- larger radial field increase** **- lower acceleration efficiency (transit time factor).** **If corrected for these two effects, performances are similar.**	
Acc. Gradient of 25 MV/m		**Simulation of Q(Ea) by taking into account the deterministic performance parameters predicts possible operation at acc. gradients of 25 MV/m and more at all lHe temperatures, with a smaller margin at 1408 MHz and 4.5 K.** ***Note added after the meeting: (i) In particular, there is not advantage to go to super-fluid helium;*** ***(ii) if 1408 MHz is chosen, the operating temperature should be significantly below 4.5 K***
	Test results from outside labs show that acc. gradients of 16 – 23 MV/m ($\beta = 1$ cavities) for a production yield of 90 % are possible. **Higher gradients (20 – 30 MV/m) are possible at the expense of a lower production yield (~ 50%).** **Electro-polished and baked 1.3 GHz mono-cell and 9-cell cavities exhibit no significant difference in yield** ***Note added after the meeting:*** ***(i) cavity surface/number of cells/frequency to a large extent not determinant for the acc. gradient***	

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	(ii) Electropolished cavities allow higher yield than chemically polished cavities	
Q-factor of 10^{10}	**A residual surface resistance corresponding to a Q-value of 10^{10} at the operating gradient presents a challenge.**	
Electrical grid to beam power transfer efficiency	**The power consumption for the high power SPL is dominated by RF. It has the largest grid to beam power transfer efficiency (~ 24 %) at 2.5 K and 1.4 GHz.** **The power consumption for the low power SPL is dominated by cryogenics. The grid to beam power transfer efficiency depends only weakly on the frequency and increases with temperature (2 – 4 %).** ***Note added after the meeting:*** ***(i) If 1400 MHz is chosen, the operating temperature should be in the range of 2.5 K for both the HPSPL and the LPSPL*** ***(ii) i) If 700 MHz is chosen, the operating temperature should be in the range of 4.5 K for both the LPSPL and the HPSPL (with a possibility to lower the temperature for the HPSPL to gain some percent in efficiency if wished so)***	