

RF/SRF Working Group Charge

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The overall charge to Working Group 3 on superconducting RF, RF, and RF control is to identify critical RF and SRF related items for the construction of ERLs, evaluate the readiness of the related science and technology, and to lay out an R&D path for solving remaining open issues. In particular the following questions will be explored:

- What parameter space is covered by ERLs presently under discussion? A *template/questionnaire will be distributed in advance to participants of the WG, which should be submitted prior to the workshop.*
- What cavity performance is currently achievable with good reproducibility? What intrinsic cavity Q_0 is achieved in current SRF linacs (CEBAF, FLASH...)? What is needed to increase it further? What is the best cavity surface treatment for achieving lowest surface resistance at medium fields? What field emission level should be expected at operating gradients? Which component/step during the beam line assembly has the highest risk of causing field-emitting particles? What diagnostics is needed for the detection of field emission and optimization of the operating gradients in a main linac?
- What loaded quality factor Q_L is currently achievable with stable cavity operation and good field stability? What is needed to increase it further? What is the optimal loaded Q ? What field stabilities have been demonstrated at high Q_L ? Is an adjustable input coupler essential? What LLRF systems have been developed specifically for high loaded Q operation and what are the related challenges?
- What main linac cavity designs have been developed for ERLs? What design criteria were used? *A template/questionnaire on cavity design will be distributed in advance to participants of the WG, which should be submitted prior to the workshop.*
- How can peak cavity microphonics be reduced in SRF main linacs by passive and active means? What is the main source driving microphonics? What is a realistic value for the peak detuning in SRF linacs over a period of a day? What is the ideal frequency tuner in terms of microphonics and its compensation?
- What RF input couplers have been developed? *A template/questionnaire on RF input couplers will be distributed in advance to participants of the WG, which should be submitted prior to the workshop.*
- What HOM damping schemes have been developed? What is their parameter space?

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- What are the cryomodule challenges, and how can they be addressed? What method gives the highest reliability for vacuum sealing at cryogenic temperatures? What precision is needed for the cavity alignment, and how can it be achieved? What level of magnetic shielding is needed and how can it be achieved?
- What are the injector RF/SRF challenges, and how can they be addressed?
- What is the best RF power source for the main linac SRF cavities? What is currently available, and what will be the future direction?
- How should the cryogenic plant for an ERL linac be designed/optimized? How can it be adjusted for changes in the operating temperature and total heat load?