

Stimulating a discussion on cavity
performance metrics

Outline

- Of course, we start from the functional specification, then we add some details and criteria on:
 - Beam Physics
 - SRF Design and performance
 - Safety and Integration
 - Planning
 - Other
- Fully dressed cavities

Beam Physics

- Impedance + HOMs
 - HOM location addressing specific dangerous frequencies
 - Specify beam spectrum and power associated
 - Two main threatening modes
 - Acceptable impedance after damping
- Gradient/kick
 - Margin over gradient
- $R_s \times R_t$
 - Margin over spec and reproducibility
- Robustness on fabrication errors
 - Multipoles – field uniformity
 - A mix of measurements and calculations
- Aperture

SRF design

- Max electric and magnetic field
- Cryogenic load and heat rejection
- Lorentz detuning parameter
- Material qualification
- Tuning
- Mfg, leak test, vacuum level

SRF performance

- Multipacting + conditioning
- Field emission
- Margins for reliability
 - Quench level above operating gradient
- Trip rates
 - beam induced

Safety and Integration

- Pressure vessel requirements
- Machine protection
- Size and interfaces
- Modularity
- LHC implementation
 - Does not preclude LHC implementation
 - I.e. Bare cavity should be useable in H or V

Planning

- Schedule, cost, risk
 - ease of manufacturing
 - Ease of processing
 - Technical complexity
 - Material choice

Questions and comments

- Do we weigh these, how?
- Do some have 'veto power'...?
 - Must meet spec
- Limit for now to SPS installation?
 - But not preclude LHC implementation