

**Characterization of HOMs in RF Cavities\***,  
C. LIMBORG, J. SEBEK, SSRL, SLAC - We present an inexpensive method to measure, with beam, the Rs and Q of narrow-band high order resonances in RF cavities. Since SPEAR has neither HOM dampers, nor a feedback system to damp longitudinal oscillations, nor precise temperature regulation, the choice of working points of the RF cavities is particularly delicate. A small change over one of the 3 degrees of freedom (2 tuners and the temperature) can dramatically shift the frequency of a harmful high order resonance so that it can cause longitudinal coupled bunch instabilities. The other major motivation for this study was to evaluate the feasibility of keeping the present RF cavities for the proposed upgraded SPEAR version which will initially be run at 200 mA, twice the present current. We developed a systematic method, using only standard laboratory equipment, to obtain the Rs and Q values of the most dangerous resonances. We also compare these results with cold cavity measurements and simulations. We now have a mapping of the resonances in the 3D parameter space, which enables us to operate the machine with a good beam quality.

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