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High beta and low beta 650 MHz PIP-II cavity testing at Fermilab 650STC

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The Fermilab 650 STC (Spoke resonator Test Cave) is used as a horizontal test facility for the PIP-II 650 MHz Low Beta(LB) and HB superconducting cavities provided by INFN(Italy) and RRCAT(India). The cavities are 5-cell elliptical doublet type with betas of 0.61 and 0.9. Testing of two HB cavities has been completed and testing with a LB cavity is in progress. Coupler thermal testing, tuner range and sensitivity characterization, Lorentz force detuning (LFD) measurements, cavity sensitivity to helium bath pressure variations and cavity conditioning are some of the tests completed in the initial segment. LLRF studies are conducted in the second stage of the testing. Cavity detuning measurement calibration, microphonics studies, piezo tuner performance, field control and resonance control performance parameters are some of the system measurements completed. The test procedures, data and performance of the cavities are described in this paper.

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