

The Design and Performance of the Fermilab ASTA Phase Averaging 1300 MHz Phase Reference Line

At Fermilab's Advanced Superconducting Test Accelerator, a 1300 MHz Phase Reference Line based on a forward and reflected wave "phase averaging" technique has been installed and is now operational. The concept of the design is to send an RF signal down a length of $7/8$ " Heliax cable with a short circuit on the end of the line while using dual directional couplers to couple the forward and reflected signals out of the line at specific points along the line. The forward and reflected signals are then summed together to realize an averaged phase that is not sensitive to variations in cable, such as flexing or temperature drift. A method is also outlined to minimize the effects of VSWR mismatches and directivity of the directional couplers. The details of the concept, design and measured stability of the reference line are presented.

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