

DESIGN OF STRIP-LINE BPM FOR LARGE THERMAL STRESS CONDITIONS

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Abstract

Jefferson Lab FEL operates DC photo gun and GaAs photocathode. Operation with average current of several mA and sufficiently long cathode lifetime requires pressure in the gun region at least at the $1\text{E-}11$ Torr level or better. To achieve such low pressure the gun chamber and the adjacent beam line are baked for an extended period of time. This imposes an additional requirement of withstanding the bake on all diagnostic elements. Additionally, analyzing beam line temperature in a high current energy-recovering linac as ones considered for future light sources, it was found that due to the short bunch length the resistive wall losses can be very high, which can cause large thermal stress to the beam line elements. With these in mind we have designed a modified strip-line beam position monitor with a flexible connection between the strip-line electrode and the central pin of conflate mounted SMA feedthrough. The design is based on a BPM previously developed for radiation source ELBE. To make manufacturing of the BPM more precise and less costly, brazing is used in place of welding. Mechanical and microwave design of the BPM is presented with initial microwave characterization.

CONTRIBUTION NOT RECEIVED