

Design and simulation of Virtual Pepper-Pot method for low energy proton beam

Thursday 29 August 2024 16:00 (2 hours)

The Virtual Pepper Pot (VPP) is a 4D transverse phase space measurement technique based on pepper-pot-like patterns that are generated by crossing each measured horizontal slit-based beamlet with all measured vertical slit-based beamlets. The VPP beam phase space distribution reconstruction and simulation are performed using the Beam Delivery Simulation (BDSIM) code, which is a Geant4 toolkit. The configuration includes a VPP 3D model slit, a scintillator screen, and a user-defined 1 MeV energy and 10 mA current proton beam distribution, characteristic of the KOMAC RFQ beam test stand. Besides VPP, pepper pot mask simulation is carried out, and the intensity and emittance differences are observed. The input beam distribution is generated from a TraceWin output file for comparison of results. The comparison between the VPP analysis results and the TraceWin input shows satisfactory results, ensuring accurate estimation of the emittance.

Footnotes

Funding Agency

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Session Classification: Thursday Poster Session

Track Classification: MC1: Beam Dynamics, Extreme Beams, Sources and Beam-Related Technologies; MC1.1 Beam Dynamics, beam simulations, beam transport