

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

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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

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Primary author: COSGUN, Emre (Ulsan National Institute of Science and Technology)

Co-authors: MOON, Seok Ho (Korea Multi-purpose Accelerator Complex); KIM, Dong-Hwan (Korea Multi-purpose Accelerator Complex); CHUNG, Moses (Pohang University of Science and Technology); HUR, Min Sup (Ulsan National Institute of Science and Technology)

Presenter: COSGUN, Emre (Ulsan National Institute of Science and Technology)

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