

WAO'18: Workshop on Accelerator Operations



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AGS IPM and eIPM Beta Function Measurements

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Knowing the transverse emittance through the acceleration cycle is imperative for efficient and successful operations. Relative measurements provide details of emittance growth problems while absolute measurements provide beam expectations upstream and downstream of the measurement. Both measurements are needed to fully understand the emittance as a whole. We learn the emittance by measuring the width of the beam and then translating that into an emittance knowing the beta function at the measuring instrument. Thus the knowledge of the emittance is proportional to the knowledge of the beta. One can learn the beta by distorting the equilibrium orbit of a functioning machine by adding a dipole and then measuring the resulting orbit motion. Using an ionization profile monitor local to said dipole, one attains the position-measuring capability by using the resulting centroid of the ion beam image provided. With additional standard beam measurements and parameters, operations has been able to successfully measure the local beta function at four separate locations in the Alternating Gradient Synchrotron at Brookhaven National Laboratory. The goal is to demonstrate the evolution of these measurements and compare the results to model optics.

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