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Coherent radiation from initially modulated beams using emittance exchange at the Argonne Wakefield Accelerator

An emittance exchange (EEX) beamline may provides a unique capability in transferring a transverse beam density modulation into longitudinal bunching. This process can be advantageous for achieving coherent bunched current at below the micron level. This can provide conditions of super-radiance in a radiating system, or a large input signal for a high gain the FEL process. This mechanism has been proposed to enable FEL action down to the few nm scale for future facilities. We investigate the feasibility of creating longitudinal density modulation at the Argonne Wakefield Accelerator, beginning with the case of 800 nm bunching in a pC-level beam. We discuss plans for modulated beam creation, collective and nonlinear effects the EEX beamline and subsequent radiation-based diagnosis via CTR or FEL processes.

Working group

WG5 : Beam sources, monitoring and control

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