Contribution ID: **8** Type: **not specified**

Recent studies of the electron cloud induced beam instability at the Los Alamos PSR

Saturday, October 9, 2010 9:30 AM (30 minutes)

Recent beam studies have focused on two aspects of the observed e-p instability at the Los Alamos Proton Storage Ring (PSR). 1) Most recently it has been observed that a stable beam with the standard production bunch width (290 ns injected beam bunch width) will become e-p unstable when the bunch width is shortened to 200 ns or less. This was not the case years earlier. Experimental characteristics and possible explanations of this recent "short pulse instability phenomenon"will be presented. 2) Other beam studies have focused on understanding the main sources and locations of electron clouds (EC), which drive the observed e-p instability. Significant EC signals are observed in drift spaces and quadrupole magnets at PSR which together cover ˜65% of the ring circumference. Results making use of two longitudinal barriers to isolate the drift space electron diagnostic have provided definitive evidence that most of the drift space EC signal is "seeded"by electrons ejected longitudinally by ExB drifts from adjacent quadrupole magnets. This result can explain why weak solenoids and TiN coatings in several drifts spaces had no effect on the e-p instability threshold. Modeling of EC generation in 3D quadrupoles using a modified version of the POSINST code shows that a sizeable fraction of the electrons generated in the quadrupoles are ejected longitudinally into the adjacent drifts. The experimental findings and simulation results of this focus will be summarized.

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Session Classification: Updates from Operating Machines

Track Classification: Oral Sessions