

## John Adams Institute for Accelerator Science Lecture Series

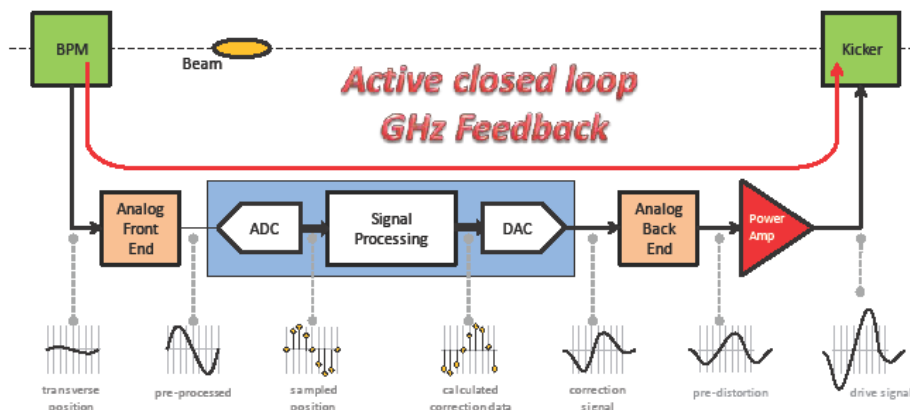
Friday 12<sup>th</sup> February 2016 at 2:15 pm  
Fisher Room, Denys Wilkinson Building

### *Wideband intra-bunch feedback systems – opportunities, challenges and first results*

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Control of particle beam instabilities is of great interest for light sources and accelerators. These instabilities can be driven by impedances, external particles such as electrons or ions, or through interactions with active accelerator systems. Many operating facilities require coupled-bunch feedback systems to achieve design currents. This talk presents work focused on control of intra-bunch hadron beam transverse instabilities, where the instabilities are single-bunch modes within a bunched beam. The work includes simulation of beams and feedback channels, as well experimental measurements of beams in the SPS at CERN. Our group at SLAC and CERN has developed an operational “demonstration feedback system” which uses 4 GS/s sampling and DSP signal processing to achieve a 1 GHz control bandwidth. We highlight the technology developed to counteract TMCI and Electron-cloud instabilities, and show some of the challenges in designing such a wideband feedback system. Results are presented from recent experimental measurements at the SPS showing the excitation and damping of beam motion.

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