

Dynamics of Bunched Beam Laser Cooling,

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National Laboratory, USA - Since its first demonstration in
1995, laser cooling of bunched beams in a synchrotron
storage ring has been intensely studied, and demonstration
of the existence of a transverse to longitudinal coupling via
intra beam scattering has been demonstrated. In this paper
we present the most recent studies on the dynamics of
bunched beam laser cooling. Using a recently developed
technique for transverse diagnostics which images the
fluorescent light from the laser-cooled ion beam onto a high
resolution CCD chip we have studied the transverse to
longitudinal coupling during bunched beam laser-cooling,
and seen evidence for 3-D space charge dominated bunches.
We furthermore demonstrate that the fluorescence based
method of transverse diagnostics is capable of measuring
ultra-low intensity beams in the range where string structure
would be expected for ultra low temperatures.