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# Exploring the limits of bunched beam laser cooling of relativistic stored ions

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Laser cooling has been successfully demonstrated at the ESR, using bunched beams of Li-like carbon ions at 47% of the speed of light. We now wish to explore the limits in terms of particle number (stored ions), temperature (relative momentum spread) and stability (over time) more carefully. We propose to study these using a "chain" of stored ions in the ESR. In addition, we wish to study a scheme for transverse cooling of the stored ion beams. Finally, we would like to study the fluorescence, emitted from the laser-excited ions, in more detail. Especially the distribution of fluorescence within a bunch of ions is of interest. Ultimately, one might find an answer to the question if the fluorescence emission from ion bunches is somehow coherent. We will request one week of beamtime (21 shifts) for these studies at the ESR.

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