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Laser cooling of ion beams - from ESR and CSRe to HIAF and FAIR

We present recent results from laser cooling and preparatorial experiments at ESR and CSRe. One of the first steps towards laser cooling of highly charged ions at high beam energies will be the development and testing of laser systems with large frequency range to address the initially broad momentum spread of ion beams injected into a storage ring. For Li-like and Na-like heavy ions transition life times are short, demanding high laser intensities for saturation of the cooling transition. We show how a combination of scanning cw and pulsed lasers can be used for efficient cooling and how advanced optical detection techniques can complement standard beam diagnostics.

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