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CW and Pulsed UV Laser Systems for Laser Cooling Applications at the SIS100

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Laser cooling, unlike established cooling methods such as electron cooling, promises to efficiently produce narrow longitudinal momentum distributions in relativistic bunched ion beams, even at large gamma factors. The concept was demonstrated (e.g. at the GSI in Darmstadt) using cw and pulsed laser systems separately, while the laser cooling facility in the upcoming heavy-ion synchrotron SIS100 at the FAIR facility will employ three laser systems simultaneously.

In this talk, two of these laser systems - the cw and a pulsed laser system - will be presented. Both operate at wavelengths of 514 nm and 257 nm, achieved via second-harmonic generation.
The cw laser system shows stable long-term operation with a high power output of 15 W in the green and 2 W in the UV region.
The pulsed laser system reaches average output powers of 34 W (green) and 5 W (UV), respectively. Its pulse duration and repetition rate can be adjusted within ranges of 46 - 734 ps and 1 - 10 MHz, with an additional frequency tuning range of 3.4 THz in the UV.

Autor: GRUNWITZ, Tamina (TU Darmstadt, HFHF Campus Darmstadt)

Co-Autoren: Dr. LANGFELD, Benedikt (TU Darmstadt, HFHF Campus Darmstadt); Dr. WINTERS, Danyal (GSI Helmholtzzentrum für Schwerionenforschung); SCHWARZ, Denise (TU Darmstadt); LARA, Harri (TU Darmstadt); Dr. GUMM, Jens (TU Darmstadt); Prof. WALTHER, Thomas (TU Darmstadt, HFHF Campus Darmstadt)

Vortragende(r): GRUNWITZ, Tamina (TU Darmstadt, HFHF Campus Darmstadt)

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