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New advances in optical stochastic cooling

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Recently, Optical Stochastic Cooling (OSC) became the first demonstrated method for ultra-high-bandwidth stochastic cooling. The initial experiments at Fermilab's IOTA ring explored the essential physics of the method and demonstrated cooling, heating and manipulation of beams and single particles. Having been validated in practice, with continued development, OSC carries the potential for dramatic advances in the state-of-the-art performance and flexibility for beam cooling and control. The ongoing program at Fermilab is now focused on the development of an OSC system that includes high-gain optical amplification, which promises a two-order-of-magnitude increase in the strength of the OSC force. In this talk, we briefly review the results of the initial experimental campaign, describe the status of the conceptual and hardware designs for the amplified OSC system, report initial experimental results of our high-gain amplifier development, and explore near-term operational plans and use cases.

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