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Rotational Cooling of Trapped SiO^+ by Optical Pumping DAVID TABOR, JASON NGUYEN, YEN-WEI LIN, FILLAN GRADY, BRIAN ODOM, Northwestern University — We present results for preparation of trapped molecular ions with a high degree of internal state purity by optical pumping with a broadband pulse-shaped femtosecond laser. The highly diagonal Franck-Condon factors of the dipole-allowed B-X transition in SiO^+ make optical pumping on the P-branch of this transition favorable for fast stepwise pumping through the tens of rotational levels populated in a room-temperature distribution. By using resonance enhanced multiphoton dissociation (1+1' REMPD) to state-selectively form Si^+, we probe the internal states of our SiO^+ sample and determine the degree of rotational cooling.

David Tabor
Northwestern University

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