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Trapping Metastable Krypton Atoms for Radio-Isotope Dating¹ JAKE ZAPPALA, Argonne National Laboratory; University of Chicago, KEVIN BAILEY, WEI JIANG, Argonne National Laboratory, ZHENG-TIAN LU, Argonne National Laboratory; University of Chicago, PETER MUELLER, THOMAS O'CONNOR, Argonne National Laboratory — We have developed a MOT of metastable krypton atoms achieving a loading rate of 10^{12} s⁻¹ for the abundant isotope ⁸⁴Kr. At the same time, the trap is capable of single atom detection of the rare isotopes ⁸¹Kr and ⁸⁵Kr used for radio-isotope dating. Metastable atom production via gas discharge remains a major limit to trapping efficiency. We are exploring direct optical excitation methods to overcome this limit. This technique uses a krypton lamp to produce resonant 124 nm light and an 819 nm laser to drive the krypton from the ground state to the metastable level. These advancements would lead to a next generation ATTA instrument for ⁸¹Kr dating. Improved efficiency would open up new opportunities such as dating deep ice core samples.

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