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Selective Laser Ablation Ion-Trap Loading of $^{137}Ba^{+}$

Monday 7 June 2021 13:07 (4 minutes)

The $^{137}Ba^{+}$ ion is a promising candidate for high-fidelity quantum computing. We generate barium atoms using laser ablation of a $BaCl_2$ target. The flux of neutral atoms generated by ablation is then ionized near our ion trap-center, giving us trapped ions which we can then use for quantum computing. Laser ablation loading can be used to trap ions more quickly and with less added heat load than other common loading methods. Because of the relatively low abundance of the isotope of interest, a two-step photoionization technique is used, which gives us the ability to selectively load a desired isotope. In this talk, I discuss characterization of the ablation process for our $BaCl_2$ targets, including typical fluences needed, preparation and lifetimes of ablation spots, and plume temperature estimates. We demonstrate loading of single $^{137}Ba^{+}$ ions with high selectivity compared to its 11% natural abundance.

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