

Abstract Submitted
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The $2F_{7/2}$ state of Yb^+ as a resource for achieving ultra-high SPAM fidelity ANTHONY RANSFORD, CONRAD ROMAN, WESLEY CAMPBELL, UCLA — The unique, low-lying f state in Yb^+ is currently employed in quantum information science almost exclusively for making clocks and optical-frequency qubits. We describe how this resource can be used with the ground state manifold to aid in the scaling of trapped Ion quantum information science. Narrow-band optical pumping into the $F_{7/2}$ from one of the conventional $S_{1/2}$ qubit states is projected to achieve a higher state preparation and measurement (spam) fidelity than any other demonstrated technique. As it is based on frequency-selective optical pumping, this scheme is straightforward, does not require extreme polarization purity or intensity control, and can be implemented by any groups already using YB^+ with very few changes to their apparatus.

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