# Ytterbium (Yb), a suitable option for neutral atom quantum computing: electronic states perspective

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Many different quantum computing platforms have reached large system sizes and are able to perform high-fidelity operation. Such platforms include superconducting qubits, optical interferometers, trapped ions and neutral atoms. Most of the neutral atom quantum computing have been performed using alkali metal atoms like Rb, Cs. But alkali metal atoms have some drawbacks such as the interaction of electronic spin states with the light field which traps the atoms resulting in the corruption of quantum memory information. On the other hand, alkaline-earth atoms such as $^{87}$Sr, $^{171}$Yb are robust to perturbation by the optical trap. Alkaline earth atoms such as $^{87}$Sr, $^{171}$Yb store the quantum information in the nuclear spin states. But the large nuclear spin of $^{87}$Sr (I = 9/2) makes it difficult to control the parameters compared to $^{171}$Yb in which the nuclear spin is 1/2. The quantum gate operations are performed based on interaction mediated by Rydberg states. The rich internal structure of $^{171}$Yb atoms allows for numerous possibilities of cooling and trapping while remains robust to external perturbation.