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Detection of new auto-ionizing states of ^{28}Si using resonant ionization WILLIAM CZAJKOWSKI, JON KLUCK, KATHERINE ZAUNBRECHER, SIU AU LEE, WILLIAM FAIRBANK, Colorado State University — We are developing a scalable, solid state, quantum computer based on the Kane proposal of using $^{31}P^{+}$ donor ions in Si as qubits. This involves the placement of P^{+} into a Si substrate with nm precision. We plan to accomplish this by laser cooling and trapping single, ablated, radioactive, ^{31}Si atoms in a magneto-optical trap (MOT) prior to implanting them into a Si substrate. ^{31}Si subsequently beta decays into $^{31}P^{+}$, forming the qubit. To gain experience before handling short lived, low abundance radioactive materials the techniques to make these measurements are being developed on ^{28}Si. In this talk we will report on measurements of ^{28}Si resonance ionization spectroscopy near the first ionization limit, including newly discovered auto-ionizing states. These states were detected by scanning a pulsed dye laser across a beam of excited atoms. Using this method we generated a saturation curve and calculated the photoionization cross section for the lowest lying state above the ionization limit. Additionally we will report on initial studies of laser ablation of a solid silicon sample. Research supported by the W. M. Keck Foundation and the National Science Foundation. †Fellowship support provided by the U.S. Military Academy, West Point, NY.

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