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Experimental progress with novel surface electrode ion trap structures for quantum information processing CRAIG CLARK, MATTHEW BLAIN, FRANCISCO BENITO, CHIN-WEN CHOU, MIKE DESOUR, ROB ELLIS, RAY HALTLI, EDWIN HELLER, SHANALYN KEMME, JON STERK, BOYAN TABAKOV, CHRIS TIGGES, PETER MAUNZ, DANIEL STICK, Sandia National Laboratory — Segmented surface electrode ion traps are one of the most mature platforms among candidates for scalable quantum information processing. In this poster, an overview of current results from four specific projects will be presented. Two projects involve increased light collection from trapped ion for state detection and/or remote entangling of distant ions. The first involves cavity integration into a linear surface trap, and the second, involves integration of diffractive optical elements into a linear surface trap for increased light collection. Another project involves a trap with a ring geometry which could be used to trap long chains of equally spaced ions. Finally, we report on initial testing of a trap structure with vastly improved in-plane optical access. In this structure in-plane beams can be focused to less than 8 microns while keeping a distance of at least 5 beam radii to the trap structure. Along with these projects other relevant progress from Sandia National Laboratory's ion trap group will be presented. This work was supported by Sandia's Laboratory Directed Research and Development (LDRD) and the Intelligence Advanced Research Projects Activity (IARPA). Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the US Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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