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A Compact Cryogenic Package Approach to Ion Trapping¹ ROBERT SPIVEY, VOLKAN INLEK, GEERT VRIJSEN, YUHI AIKYO, Duke University Department of Electrical and Computer Engineering, MEGAN IVORY, ALEX KATO, EVAN SALIM, ColdQuanta, Inc., PETER MAUNZ, ANDREW HOLLOWELL, Sandia National Laboratories, JUNGSANG KIM, Duke University Department of Electrical and Computer Engineering — One challenge for the expansion of trapped ion systems to a large scale is the lack of repeatable integration technology to realize compact and stable operating environment. We present a novel ion trap package where conventional ultra-high vacuum (UHV) chambers are replaced with a hermetically sealed package operating in a cryogenic (5K) environment. A microfabricated surface ion trap mounted on a modified 100-pin ceramic pin grid array (CPGA) package is placed into a UHV environment. A titanium lid with windows for optical access is then attached to the CPGA via an indium seal. This seal, along with the cryogenic pumping and activated charcoal getters maintains the UHV conditions for the ion trap. Laser ablation is used to load Ytterbium ions from a target inside the small package. We present progress towards trapping in this environment as well as characterization of the ablation source.

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