Abstract Submitted
for the DAMOP15 Meeting of
The American Physical Society

Realization of Quantum Integer-Spin Chains with Controllable Interactions[1] PAUL HESS, PHILIP RICHERME, CRYSTAL SENKO, JACOB SMITH, AARON LEE, Joint Quantum Institute, ITSIK COHEN, ALEX RETZKER, Hebrew Univ. of Jerusalem, CHRIS MONROE, Joint Quantum Institute — The physics of interacting integer-spin chains has been a topic of intense theoretical interest, particularly in the context of symmetry-protected topological phases. However, there has not been a controllable model system to study this physics experimentally. We demonstrate how spin-dependent laser forces on trapped $^{171}Yb^{+}$ ions can be used to engineer an effective system of interacting spin-1 particles. Our system evolves coherently under an applied spin-1 XY Hamiltonian with tunable, long-range couplings, and all three quantum levels at each site participate in the dynamics. This experimental platform enables future studies of symmetry-protected order in spin-1 systems and their use in quantum applications.

[1]This work is supported by the ARO Atomic Physics Program, the AFOSR MURI on Quantum Measurement and Verification, and the NSF Physics Frontier Center at JQI.

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Date submitted: 22 Jan 2015 Electronic form version 1.4