Abstract Submitted
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Formal Computer Validation of the Quantum Phase Estimation Algorithm[1] WAYNE WITZEL, KENNETH RUDINGER, Sandia National Laboratories, Albuquerque, NM, MOHAN SAROVAR, Sandia National Laboratories, Livermore, CA, ROBERT CARR, University of New Mexico — While peer review and scientific consensus provide some assurance to the validity of ideas, people do make mistakes that can slip through the cracks. A plethora of formal methods tools exist and are in use in a variety of settings where high assurance is demanded. Existing tools, however, require a great deal of expertise and lack versatility, demanding a non-trivial translation between a high-level description of a problem and the formal system. Our software, called Prove-It, allows a nearly direct translation between human-recognizable formulations and the underlying formal system. While Prove-It is not designed for particularly efficient automation, a primary goal of other formal methods tools, it is extremely flexible in following a desired line of reasoning (proof structure). This approach is particularly valuable for validating proofs that are already known. We will demonstrate a validation of the Quantum Phase Estimation Algorithm using Prove-It. Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energys National Nuclear Security Administration under contract DE-AC04-94AL85000.

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