

Programming tools for quantum simulators

The first quantum computation devices will most likely not be fully universal quantum computers, but more constrained machines. A case in point are quantum simulators based on optical lattice systems.

We plan to:

- devise quantum programming tools for such situations;
- develop approaches for automatic translation of quantum many-particle problems (expressed in Hamiltonians in the language of second quantization operators) using symbolic manipulation to a form suitable for evaluation on quantum hardware;
- find strategies for debugging and testing correctness of quantum algorithms and calculations.

Related prior work:

R. Žitko, SNEG - Mathematica package for symbolic calculations with second-quantization-operator expressions, *Comp. Phys. Comm.* 182, 2259 (2011)