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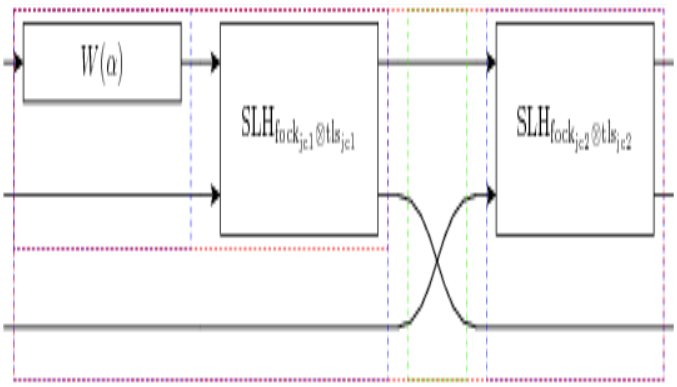
Developing Quantum Algorithms in HPC Environment

S&T Campaign: Computational Sciences
Computing Sciences

Dr. Michael Goerz, (301) 394-4302
Dr. Radhakrishnan Balu, (301) 394-4302
Radhakrishnan.balu.civ.civ@mail.mil

Research Objective

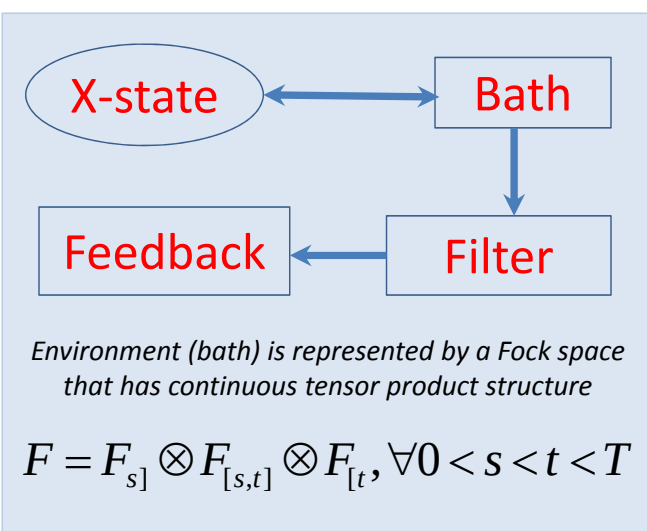
- Develop HPC based tools to model quantum feedback networks: Quantum hardware description language (QHDL)



QHDL model for open J-C systems

Challenges

- Extend the framework to hybrid quantum hardware
- Scale the algorithms for larger networks



Quantum Markov semigroups based evolution of open systems

ARL Facilities and Capabilities Available to Support Collaborative Research

- ARL- DoD supercomputing research center infrastructure to build highly scalable modeling and simulations tools
- Multi-disciplinary team with background in quantum, computational sciences, and mathematics to formulate and experimentally validate models and novel algorithms

Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- Experience in numerical methods to solve stochastic Schrodinger equation
- Expertise in theoretical and computational modeling
- Expertise in c-QED and neutral atoms based networks
- Suggestions for innovative approaches to model interconnected quantum systems

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