

Shi Guo

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SUMMARY

9 years of experience in designing, maintaining and testing large-scale C++/Java projects in both scientific research and industry.

5 years of experience of computational physics research focusing on quantum Monte Carlo simulation.

5 years of experience in develop semiconductor device testing program in c++/Java. Building and implementing test methodologies(including DC, digital, radio frequency) for different semiconductor devices.

Strong math background in linear algebra, numerical optimization, stochastic calculus.

Strong physics background in quantum mechanics and solid state physics.

[**External Project**] Implemented derivative pricing algorithms(analytical and Monte Carlo)in java based various different models(Black-Scholes, Heston). Project Link: https://guoshi1984.github.io/quant_lib

EXPERIENCE

Principal Software Engineer, Cadence Design System, Inc. Nov.2020 - Now

Developed Cadence Spectre simulation platform.

Application Engineer, Advantest America, Inc. July.2013 - Feb.2020

Developed and delivered system on semiconductor device test programs for Advantest 93K tester platform.

Achievement Highlights

- Developed test methods in C++/java for DC test, digital test, RF test.
- Developed universal test method library for On-Die Parametric test on different TI DSP device, provide device characterization results to R&D.
- Provided on-site pre-sales support for different customers to trouble-shoot any tester hardware/software related problems.
- Built data analysis tool using python(including scipy, pandas library) to do production data audit and statistical analysis(GR&R).

Research Assistant, Department of Physics, North Carolina State University, Jun.2009-Jun.2013

Conducted computational physics research focusing on electronic structure using quantum Monte Carlo method, developed and maintained computational software code in C++ for 4 years.

Achievement Highlights

- Conducted parallel-computing simulations on supercomputers using first-principles methods, including Hartree-Fock, Configuration Interaction, Density Functional Theory, Quantum Monte Carlo, etc.
- Built trial wavefunction for Quantum Monte Carlo using one-particle orbitals generated by Quantum Chemistry or Density Functional Theory.
- Based on variational principle, using Metropolis-Hanstings algorithm to generate samples from trial wavefunction distribution.
- Carried out numerical wavefunction optimizations(steepest descent, quasi-Newton, etc.) to reduce the variational energy.

- Used diffusion process to evolve wavefunction distribution, captured the ground-state wavefunction and evaluated the ground-state energy.
- Evaluated the dipole moment of weakly bonded ultracold molecules precisely using Quantum Monte Carlo method and provided the data with good quality to research funding agency.
- Introduced new mathematical models for electron spin and built into the existing algorithm to extend the features of the program to handle spin-dependent systems, designed every class and method independently using C++(10k lines).
- Performed the first successful calculation in literature on relativistic effects of two dimensional electron gas in semiconductor devices.

EDUCATION

- **Ph.D Physics**
North Carolina State University, Raleigh, NC, USA, Dec.2013 GPA:3.63/4.0
- **B.S. Physics, Minor in Economics**
Shanghai Jiaotong University, Shanghai, China, Jun.2007

PUBLICATION

- **Shi Guo**, Michal Bajdich, Lubos Mitas and Peter J. Reynolds; Study of dipole moments of LiSr and KRb molecules by quantum Monte Carlo methods; Molecular Physics Vol. 111, Iss. 12-13,2013
- Cody A. Melton, Minyi Zhu, **Shi Guo**, Alberto Ambrosetti, Francesco Pederiva, and Lubos Mitas; Spin-orbit interactions in electronic structure quantum Monte Carlo methods; Phys. Rev. A 93, 042502