Joshua Goings | Curriculum Vitae

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Education

University of Washington **Seattle**
PhD Theoretical Chemistry, Advisor: Prof. Xiaosong Li *2012–2017*

Seattle Pacific University **Seattle**
Dual BS Chemistry & Biochemistry, GPA – 3.93/4.00, Summa Cum Laude *2008–2012*

Research Interests

- Development of first-principles electronic dynamics including multiple electromagnetic fields.
- Development of relativistic many body methods for magnetic and heavy-element materials.
- Electromagnetic response properties of dilute magnetic semiconductor quantum dots.
- Simulation of high-resolution spectroscopy and femtochemistry for photovoltaics and spintronics.

Honors and Awards

2016: Chemical Computing Group (CCG) Excellence Award

2014: National Science Foundation (NSF) Graduate Research Fellow

2014: Bernard and Claudine Nist Endowed Fellowship in Chemistry

2014: Peter Salamon Award, Telluride Science Research Center

2012: Natt-Lingafelter Graduate Fellowship Award

2010: NSF Research Experience for Undergraduates (REU) Fellow
(with Prof. Michael B. Smith, Univ. of Connecticut.)

Presentations

2016: "Recent advances in real-time TDDFT for the description of optical activity" Poster Presentation. LUEST 2016, Telluride.

2016: "Towards a Real-Time Description of Magnetic Systems with Applications to Magnetic Circular Dichroism Spectroscopy." Poster Presentation. 251st ACS National Meeting, San Diego.

2015: "Theoretical investigation of magnetic exchange interactions in dilute magnetic semiconductor quantum dots induced by defects." Oral Presentation. Pacifichem 2015, Honolulu.

2015: "Linear Response Complex Generalized Hartree-Fock." Oral Presentation. 249th ACS National Meeting, Denver.

2014: "Equation of motion formalism of second order many-body perturbation theory (EOM-MBPT2) and second-order approximate coupled-cluster (CC2)." Oral Presentation. 248th ACS National Meeting,

San Francisco.

2014: "Low-Scaling Approximations to the Equation of Motion Coupled-Cluster Singles and Doubles Equations." Oral Presentation. TSRC Excited States and Time-Dependent Electronic Structure Theory, Telluride.

Publications

(12): F. Egidi, **J. J. Goings**, M. J. Frisch, X. Li, "Relativistic Two-Component Linear Response Methods for Calculating Excited State Fine Structures," 2016, *Under Review*.

(11): **J. J. Goings**, X. Li, "An Atomic Orbital Based Real-Time Time-Dependent Density Functional Theory for Computing Electronic Circular Dichroism Band Spectra," *J. Chem. Phys.* 2016, *Just Accepted*.

(10): L. Nienhaus*, **J. J. Goings***, D. Nguyen, S. Wieghold, J. Lyding, X. Li, M. Gruebele, "Imaging Excited Orbitals of Quantum Dots: Experiment and Electronic Structure Theory", 2015, *J. Amer. Chem. Soc.* 2015, 137 (46), 14743–14750. *Authors contributed equally to work

(9): **J. J. Goings**, F. Ding, E. R. Davidson, X. Li, "Approximate Singly Excited States from a Two-Component Hartree-Fock Reference," *J. Chem. Phys.* 2015, 143 (14), 144106.

(8): F. Ding, **J. J. Goings**, H. Liu, D. Lingerfelt, X. Li, "Ab Initio Two-Component Ehrenfest Dynamics," *J. Chem. Phys.* 2015, 143 (11), 114105.

(7): B. Peng, P. J. Lestrange, **J. J. Goings**, M. Caricato, X. Li, "Energy-Specific Equation-of-Motion Coupled-Cluster Methods for High-Energy Excited States: Application to K-Edge X-ray Absorption Spectroscopy," *J. Chem. Theory Comput.* 2015, 11 (9), 4146–4153.

(6): **J. J. Goings**, F. Ding., M. J. Frisch, X. Li, "Stability of the Complex Generalized Hartree-Fock Equations," *J. Chem. Phys.* 2015, 142 (15), 154109.

(5): F. Ding, **J. J. Goings**, M. J. Frisch, X. Li, "Ab initio non-relativistic spin dynamics," *J. Chem. Phys.* 2014, 141 (21), 214111.

(4): **J. J. Goings**, A. M. Schimpf, J. W. May, R. W. Johns, D. R. Gamelin, X. Li, "Theoretical Characterization of Conduction-Band Electrons in Photodoped and Aluminum-Doped Zinc Oxide (AZO) Quantum Dots," *J. Phys. Chem. C.* 2014, 118 (46), 26584–26590.

(3): **J. J. Goings**, M. Caricato, M. Frisch, X. Li, "Assessment of Low-scaling Approximations to the Equation of Motion Coupled-Cluster Singles and Doubles Equations," *J. Chem. Phys.* 2014, 141 (16), 164116.

(2): **J. J. Goings**, S. Ohlsen, K. Blaisdell, D. Schofield, "Sorption of H_2 to Open Metal Sites in a Metal Organic Framework: A Symmetry Adapted Perturbation Analysis," *J. Phys. Chem. A.* 2014, 118 (35), 7411–7417.

(1): **J. J. Goings**, F. Ding, X. Li, "Self-Consistent-Field using Direct Inversion in Iterative Subspace Method and Quasi-Newton Vectors," *Adv. Quantum Chem.* Vol. 68, 2014, 77–86.

Professional Societies

2013–: American Chemical Society (ACS), Member

2012–: Society for Industrial and Applied Mathematics (SIAM), Member

Software Contributions

`Chronus Quantum`: *open-source* real-time time-dependent Hartree Fock module to simulate various time-resolved molecular spectroscopies.

`Gaussian`: Real-Time Electronic Dynamics (RT-TDDFT and RT-HF). Efficient (P-)EOM-MBPT2 modules for computing accurate molecular excited state properties.

Computer skills

Advanced: `FORTRAN`, `python`, `gnuplot`, LaTeX, `MATLAB`, `UNIX`/Shell

Basic: `C++`, `javascript`