

Tim Younkin

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EDUCATION

University of Tennessee, Knoxville, Tennessee, USA

- Ph.D. in Nuclear Engineering Aug 2014 – Nov 2019
 - Thesis: Fusion Reactor Plasma Facing Component Wall Erosion and Migration
 - Advisor: Prof. Brian Wirth
 - Focus: Plasma-Surface Interaction, erosion, transport, high performance computing, code integration.

Georgia Institute of Technology, Atlanta, Georgia, USA

- M.S. in Nuclear Engineering Aug 2013 – Dec 2014
 - Thesis: Piecewise prediction of nuclide densities with control blade use as a function of burnup in BWR used nuclear fuel
 - Advisor: Prof. C.K. Wang
 - Focus: Fuel depletion, boiling water reactor.

University of Tennessee, Knoxville, Tennessee, USA

- B.S. in Physics Aug 2008 – Dec 2012
 - Focus in astronomy.
 - Cumulative GPA: 3.90 / 4.00

Georgia Institute of Technology, Atlanta, Georgia, USA

- M.B.A. with specialization in Management of Technology Aug 2019 – Dec 2020
 - Focus on value proposition design for technology start-ups.

SKILLS

Applied computational physics. Mathematical theory and numerical methods. High performance computing and algorithm development. Expertise in plasma physics, nuclear engineering, and computational fluid dynamics. Focus on the plasma-material interaction for fusion and isotope enrichment applications. Specialization in the erosion, ionization, migration, and deposition of impurities in the context of plasma-facing components capturing the energy-angle dependence of sputtered atoms. Computer science skills include C, C++, Fortran, Python, MATLAB, L^AT_EX, specialty in high performance computing libraries such as CUDA, THRUST, KOKKOS and development for accelerated architectures with GPUs for scientific computing applications.

RELEVANT WORK EXPERIENCE

Oak Ridge National Lab, Oak Ridge, Tennessee, USA

- Research Associate - Flow, Thermal, and Data Science Group Jul 2021 – present
 - Modeling of metal plasma, plasma chemistry, ion beam, and gas dynamics for isotope enrichment processes.
 - Data science driven approaches for machine performance and reliability predictions.

Dept. of Energy Fusion Energy Sciences Researcher, Oak Ridge, Tennessee, USA

- Post-Doctoral Fellowship Dec 2019 – Jul 2021
 - Research of drift-kinetic simulation of fusion edge-plasma physics focusing on energetic populations of ions and electrons.
 - Simulation makes use of finite element methods and high performance computing architectures.

OTHER WORK EXPERIENCE

University of Tennessee, Knoxville, Tennessee, USA

- Grad. Research Assistant, Nuclear Engineering Department, Aug 2014 – Nov 2019
Theoretical Plasma Physics Group
 - Global Impurity Transport Code <https://github.com/ORNL-Fusion/GITR> - C++ Monte Carlo particle code developed from scratch for divertor material erosion simulation.
 - Custom geometry library and algorithms developed as part of the GITR code.

Oak Ridge National Lab, Oak Ridge, Tennessee, USA

- Grad. Research Assistant, Fusion and Materials for Nuclear Systems Division, Dec 2018 – Dec 2019
Theoretical Plasma Physics Group
 - Documentation and method application of AsGARD finite element framework making use of discontinuous Galerkin formulation and wavelets for sparse grid representation <http://code.ornl.gov/asgard/asgard>.

PUBLICATIONS**JOURNALS**

- [1] T.R. Younkin, K. Sargsyan, T. Casey, H.N. Najm, J.M. Canik, D.L. Green, R.P. Doerner, D. Nishijima, M. Baldwin, J. Drobny, “Quantification of the effect of uncertainty on impurity migration in PISCES-A simulated with GITR,” *Nuclear Fusion*, Volume 62, Number 5.
- [2] A. Lasa, S. Blondel, D.E. Bernholdt, J.M.Canik, M.Cianciosa, W.R. Elwasif, D.L. Green, P.C.Roth, T.R. Younkin, D.Curreli, J. Drobny, B.D. Wirth, “Integrated model predictions on the impact of substrate damage on gas dynamics during ITER burning-plasma operations,” *2021 Nucl. Fusion* 61 116051; <https://doi.org/10.1088/1741-4326/ac2875>.
- [3] C. J. Beers, C. Lau, J. Rapp, T. Younkin, T. M. Biewer, T. Bigelow, J. F. Caneses, J. B. O. Caughman, D. L. Green, H. Meyer III, J. R. Myra, S. J. Zinkle, “RF sheath induced sputtering on Proto-MPEX part 2: Impurity transport modeling and experimental comparison,” *Physics of Plasmas* 28, 103508 (2021); <https://doi.org/10.1063/5.0065464>.
- [4] C. J. Beers, D. L. Green, C. Lau, J. R. Myra, J. Rapp, T. Younkin, S. J. Zinkle, “RF sheath induced sputtering on Proto-MPEX. I. Sheath equivalent dielectric layer for modeling the RF sheath,” *Physics of Plasmas* 28, 093503 (2021); <https://doi.org/10.1063/5.0054074>.
- [5] T. Younkin, D.L. Green, Adam B. Simpson, B.D. Wirth, “GITR: A Global Scale Accelerated Particle Tracking Code For Wall Material Erosion and Redistribution In Fusion Relevant Plasma-Material Interactions,” *Computer Physics Communications* Volume 264, July 2021, 107885; <https://doi.org/10.1016/j.cpc.2021.107885> 2019.
- [6] T. Younkin, T.M. Biewer,C.C. Klepper, and C. Marcus, “Description of the prototype diagnostic residual gas analyzer for ITER,” *Review of Scientific Instruments*, vol. 85, no. 11, 11E816, 2014.
- [7] David L. Green, Lee A. Berry, Adam B. Simpson, and Timothy R. Younkin, “Kinetic-j: A computational kernel for solving the linearized Vlasov equation applied to calculations of the kinetic, configuration space plasma current for time harmonic wave electric fields,” *Computer Physics Communications*, vol. 225, pp. 122–127, 2008.

CONFERENCES

- [8] S. K. Combs, S. J. Meitner, T. E. Gebhart, L. R. Baylor, J. B. O. Caughman, D. T. Fehling, C. R. Foust, T. Ha, M. S. Lyttle, J. T. Fisher, and T. R. Younkin, “Solidification and acceleration of large cryogenic pellets relevant for plasma disruption mitigation,” in *Proceedings of the 26th IEEE Symposium on Fusion Engineering*, Austin, Texas, USA, 2015.
- [9] J.M. Canik, A. Lasa, S. Blondel, T.R. Younkin, B.D. Wirth, M. Cianciosa, W. Elwasif, D.L. Green, D. Curreli, J. Drobny, R. Doerner, D. Nishijima, “Multi-physics Modeling of the Long-Term Evolution of Plasma-Exposed Surfaces,” in *27th IAEA Fusion Energy Conference (FEC 2018)*, Gandhinagar, India, 2018.
- [10] Wael Elwasif, Ane Lasa, Philip Roth, Timothy Younkin, Mark Cianciosa, “Nested Workflows for Loosely Coupled HPC Simulations,” in *16th ACS/IEEE International Conference on Computer Systems and Applications AICCSA 2019*, Abu Dhabi, United Arab Emirates, 2019.
- [11] Lasa A., Canik J.M., Blondel S, Younkin T.R., Curreli D., Drobny J., Roth P., Cianciosa M., Elwasif W., Green D.L., Wirth B.D., “Multi-physics modeling of the long-term evolution of helium plasma exposed surfaces,” in *Physica Scripta* Volume 2020, Issue T1711 January 2020 Article number 014041
- [12] Combs S.K., Meitner S.J., Gebhart T.E., Baylor L.R., Caughman J.B.O., Fehling D.T., Foust C.R., Ha T., Lyttle M.S., Fisher J.T., Younkin T.R., “Recent developments in support of the shattered pellet technique for disruption mitigation,” in *Proceedings - Symposium on Fusion Engineering* Volume 2016-May31 May 2016 Article number 7482364 Volume 2020, Issue T1711 January 2020 Article number 014041

REPORTS

- [13] David Bernholdt, Sophie Blondel, John Canik, Mark Cianciosa, Davide Curreli, Russ Doerner, Jon Drobny, Wael Elwasif, David Green, Ane Lasa, David Martin, Larry Owen, Philip C. Roth, Guin Shaw, Li Yang, Tim Younkin, and Brian D. Wirth, “Final Report for the FY2018 Fusion Theory and Simulation Milestone on Plasma Materials Interaction,” in *2018 FES Theory Simulation Performance Target*

**AWARDS &
SCHOLARSHIPS**

- Nuclear Regulatory Commission Graduate Fellowship, Fall 2013 through Spring 2014, Georgia Tech 2013 – 2014
- Department of Energy, Fusion Energy Sciences Postdoctoral Research Fellowship, Oak Ridge National Lab, Fusion and Materials for Nuclear Systems Division, Theory and Modeling Group. 2019 – 2021

[CV compiled on 2022-10-05]