YUAN SHI

Yuan.Shi@colorado.edu ◇ website
Department of Physics, University of Colorado Boulder

EDUCATION

Princeton University — Princeton, NJ
Ph.D. & M.A. in Astrophysical Sciences, Program in Plasma Physics — *2012-2018*

The University of Hong Kong — Hong Kong
Bachelor of Science, Mathematics and Physics — *2008-2012*

EMPLOYMENT

University of Colorado Boulder — Boulder, CO
Assistant Professor — *2023-present*
Research: magnetized laser-plasma interactions, quantum computing, relativistic-quantum plasmas

Lawrence Livermore National Laboratory — Livermore, CA
Research Scientist — *2021-2023*
Projects: quantum computing, magnetized high-energy density science

Lawrence Livermore National Laboratory — Livermore, CA
Lawrence Postdoctoral Fellow — *2018-2021*
Topics: magnetized laser-plasma interactions, plasma simulations using quantum computers

Princeton University — Princeton, NJ
Research and Teaching Assistants — *2012-2018*
Thesis: Plasma Physics in Strong Field Regimes

AWARDS

Lawrence Postdoctoral Fellowship — *2018-2021*
Marshall N. Rosenbluth Outstanding Doctoral Thesis Award — *2020*
Graduate Certificate for Computational and Information Science — *2018*
Certificate for Teaching Transcript Program — *2017*
First Year Science and Engineering Fellow — *2013*
Carl Oberman Fellowship — *2012*
Rosita King Ho Scholarship — *2008-2012*

TEACHING AND MENTORING

Instructor, General Physics I for Physics Majors — *2023*
University of Colorado Boulder
Lectures, recitations and logistics

Instructor, Quantum Computing Summer School — *2022, 2023*
Lawrence Livermore National Laboratory
Lectured on selected topics, co-organize summer school

Graduate Teaching Fellow *2016, 2017, 2018*
The McGraw Center for Teaching & Learning, Princeton University
Led Assistant Instructor orientations and coordinated pedagogical workshops

Assistant Instructor, General Plasma Physics *2014, 2015, 2016*
Astrophysical Sciences/Mechanical and Aerospace Engineering, Princeton University
Lectured on selected topics, led weekly precepts, graded assignments and exams

LEADERSHIP AND SERVICE

Mini-Conference: Plasma and quantum information sciences *2023*
65th Annual Meeting of the APS Division of Plasma Physics
Organize mini-conference, chair meetings, moderate discussions

Inertial Confinement Fusion Fall Workshop *2020*
Subgroup lead, Magnetized Laser-Plasma Interactions
Co-organized workshop, chaired meetings, moderated discussions

PUBLICATIONS

Peer-Reviewed

[1] **Y. Shi**, *Benchmarking magnetised three-wave coupling for laser backscattering: analytic solutions and kinetic simulations*, Journal of Plasma Physics **89**, 905890305 (May 2023).

[2] I. Joseph, **Y. Shi**, M. D. Porter, A. R. Castelli, V. I. Geyko, F. R. Graziani, S. B. Libby, and J. L DuBois, *Quantum computing for fusion energy science applications*, Physics of Plasmas, **30**, 010501 (January 2023).

[3] L. Manzo, M. R. Edwards, and **Y. Shi**, *Enhanced collisionless laser energy absorption in strongly magnetized plasmas*, Physics of Plasmas, **29**, 112704 (November 2022).

[4] **Y. Shi**, A. R. Castelli, X. Wu, I. Joseph, V. Geyko, F. R. Graziani, S. B. Libby, J. Parker, Y. J. Rosen, L. A. Martinez, J. L DuBois, *Simulating non-native cubic interactions on noisy quantum machines*, Physical Review A, **103**, 062608 (June 2021).

[5] **Y. Shi**, H. Qin, and N. J. Fisch, *Plasma physics in strong-field regimes: Theories and simulations*, Physics of Plasmas, **28**, 042104 (April 2021).

[6] R Gueroult, **Y. Shi**, J.-M. Rax, and N. J. Fisch, *Determining the rotation direction in pulsars*, Nature Communications, **10**, 3232 (July 2019).

[7] M. R. Edwards, **Y. Shi**, J. M. Mikhailova, and N. J. Fisch, *Laser amplification in strongly-magnetized plasma*, Physical Review Letters, **123**, 025001 (July 2019).

[8] **Y. Shi**, *Three-wave interactions in magnetized warm-fluid plasmas: general theory with evaluable coupling coefficient*, Physical Review E, **99**, 063212 (June 2019).

[9] **Y. Shi** and N. J. Fisch, *Amplification of mid-infrared lasers via backscattering in magnetized plasmas*, Physics of Plasmas, **26**, 072114 (June 2019).

[10] **Y. Shi**, *Radiation reaction of classical hyperbolic oscillator: experimental signatures*, Annals of Physics, **405**, 130 (June 2019).

[11] J. Xiao, H. Qin, **Y. Shi**, J. Liu, and R. Zhang, *A lattice Maxwell system with discrete space-time symmetry and local energy-momentum conservation*, Physics Letter A, **383**, 25446 (December, 2018).

[12] **Y. Shi**, Y. Raitses, and A. Diallo, *Controlling azimuthal spoke modes in a cylindrical Hall thruster using a segmented anode*, Plasma Sources Science and Technology, **27**, 104006 (October, 2018).

[13] **Y. Shi**, J. Xiao, H. Qin, and N. J. Fisch, *Simulations of relativistic quantum plasmas using real-time lattice scalar QED*, Physical Review E **97**, 053206 (May, 2018).

[14] **Y. Shi**, H. Qin, and N. J. Fisch, *Laser-plasma interaction in magnetized environment*, Physics of Plasmas **25**, 055706 (March 2018).

[15] **Y. Shi**, H. Qin, and N. J. Fisch, *Three-wave scattering in magnetized plasmas: from cold fluid to quantized Lagrangian*, Physical Review E **96**, 023204 (August, 2017).

[16] Q. Jia, **Y. Shi**, H. Qin, and N. J. Fisch, *Kinetic simulations of laser parametric amplification in magnetized plasmas*, Physics of Plasmas **24**, 093103 (August, 2017).

[17] **Y. Shi**, H. Qin, and N. J. Fisch, *Laser-pulse compression using magnetized plasmas*, Physical Review E **95**, 023211 (February, 2017).

[18] **Y. Shi**, N. J. Fisch, and H. Qin, *Effective action approach to wave propagation in scalar QED plasmas*, Physical Review A **94**, 012124 (July, 2016).

[19] A. Diallo, S. Keller, **Y. Shi**, Y. Raitses, and S. Mazouffre, *Time-resolved ion velocity distribution in a cylindrical Hall thruster: heterodyne-based experiment and modeling*, Review of Scientific Instruments **86**, 033506 (March, 2015).

[20] **Y. Shi**, K. Li, Y. L. Yung, H. H. Aumann, Z. Shi, and T. Y. Hou, *A decadal microwave record of tropical air temperature from AMSU-A/aqua observations*, Climate Dynamics **41**, pp. 1385-1405 (September, 2013).

Other Publications

[1] **Y. Shi**, *Nonperturbative ϕ^4 potentials: Phase transition and light horizon*, arXiv:2107.04206 (2021).

[2] **Y. Shi**, *Force, metric, or mass: Disambiguating causes of uniform gravity*, arXiv:1908.02159 (2021).

[3] T. Ma *et al.*, *Advancing high energy density science with high intensity short-pulse lasers*, white paper prepared for the NAS Plasma 2020 Decadal Assessment (2019).

[4] N. J. Fisch, **Y. Shi**, and H. Qin, *Laser scattering from strongly magnetized dense plasmas*, NNSA Stewardship Science Academic Programs Annual, pp. 22 (2019).

[5] R. Zhang, H. Qin, **Y. Shi**, J. Liu, and J. Xiao, *On the physical mechanism of three-wave instabilities: resonance between positive- and negative-action modes*, arXiv:1711.08248 (2017).

[6] **Y. Shi**, S. Keller, Y. Raitses, and A. Diallo, *Driving low frequency azimuthal mode in cylindrical Hall thruster with a segmented anode*, IEPC-2013-176, 33rd International Electric Propulsion Conference,The George Washington University, Washington, D.C., USA (2013).

[7] A. Diallo, **Y. Shi**, S. Keller, Y. Raitses, and S. Mazouffre, *Time-dependent ion velocity distribution: a novel heterodyne laser-induced fluorescence with coupled wave excitation*, IEPC-2013-239, 33rd International Electric Propulsion Conference, The George Washington University, Washington, D.C., USA (2013).

Patent Disclosures and Applications

[1] **Y. Shi**, Y. Cho, and J. L DuBois, *Compiler for decomposing general two-qubit operations into parametric single- and two-qubit gates*, Record of Invention, 2023.

[2] **Y. Shi**, M. R. Edwards, and N. J. Fisch, *Laser pulse compressor via Alfven wave in magnetized plasma*, U.S. Provisional Patent Application 62958885, January 9, 2020.

[3] **Y. Shi**, H. Qin, and N. J. Fisch, *Laser pulse compressor using magnetized plasmas*, U.S. Provisional Patent Application 62578836, October 30, 2017.

[4] **Y. Shi**, H. Qin, and N. J. Fisch, *Laser pulse compressor using magnetized plasmas*, M-925, Princeton Plasma Physics Laboratory, 2016.

[5] **Y. Shi** and Y. Raitses, *Disposable vacuum viewport protector*, Princeton Plasma Physics Laboratory, M-880, 2013.