

B. Frances Kraus

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Education

- Ph.D. Plasma Physics, Department of Astrophysics, Princeton University, Princeton, NJ 2021
Adviser: Dr. Philip Efthimion
Thesis topic: “Short-pulse-heated Plasma Dynamics near Solid Density via X-ray Lineshapes”
- M.A. Plasma Physics, Department of Astrophysics, Princeton University, Princeton, NJ 2016
- B.S. Physics and Mathematics, Minor Chinese Language, University of Alabama, Tuscaloosa, AL 2014

Research and Professional Experience

- Staff Research Physicist at Princeton Plasma Physics Laboratory (PPPL) Oct ‘21 –
Princeton, NJ
- Leading time-resolved x-ray spectroscopy experiments through LaserNetUS to investigate transport in hot, solid-density plasmas
 - Implementing advanced crystal spectrometers in collaboration with the National Ignition Facility for advanced EXAFS material characterization
 - Designing, testing and calibrating a high-resolution crystal spectrometer for the JT-60SA tokamak, a primary diagnostic of ion temperature and plasma rotation
- Graduate Research Assistant in X-ray Spectroscopy, Princeton University and PPPL Aug ‘14 – June ‘21
Princeton, NJ
- LaserNetUS Beamtime Awardee and Campaign Leader at ALEPH, Oct ‘19 / ‘21
 - Jupiter Laser Facility User and Campaign Leader, Apr ‘17 – Oct ‘18
 - Diagnosed ion temperature in solid density plasmas using advanced Stark lineshape theory
 - Inferred rapid acceleration of thermal ions with first x-ray Doppler shift measurement of laser ablation
 - Hall Thruster Experiment, Advisor Dr. Yevgeny Raitses, Aug ‘14 – Dec ‘16
 - Theory Department, Advisor Dr. Stuart Hudson, Aug ‘15 – Dec ‘16
- National Undergraduate Research Fellow at General Atomics June ‘13 – Aug ‘13
San Diego, CA
- Analyzed charge exchange recombination spectroscopy data from the DIII-D tokamak under Dr. Keith Burrell
- Research Assistant at University of Alabama Dept. of Physics and Astronomy Aug ‘12 – May ‘14
Tuscaloosa, AL
- Calibrated muon detectors and high-voltage equipment with Dr. Andreas Piepke

Selected Publications

1. Lan Gao, **B. F. Kraus**, K. W. Hill, M. B. Schneider, A. Christopherson, B. Bachmann, M. Bitter, P. Efthimion, N. Pablant, R. Betti, C. Thomas, D. Thorn, A. G. MacPhee, S. Khan, R. Kauffman, D. Liedahl, H. Chen, D. Bradley, J. Kilkenny, B. Lahmann, E. Stambulchik, and Y. Maron, “Hot Spot Evolution Measured by High-Resolution X-Ray Spectroscopy at the National Ignition Facility,” *Physical Review Letters*, 128, 185002 (2022).
2. **B. F. Kraus**, L. Gao, K. W. Hill, M. Bitter, P. C. Efthimion, T. A. Gomez, A. Moreau, R. Hollinger, S. Wang, H. Song, J. J. Rocca, and R. C. Mancini, “Solid-density ion temperature from redshifted and double-peaked Stark line shapes,” *Physical Review Letters*, 127, 205001 (2021).
3. **B. F. Kraus**, L. Gao, W. Fox, K. W. Hill, M. Bitter, P. C. Efthimion, A. Moreau, R. Hollinger, S. Wang, H. Song, and J. J. Rocca, “Ablating ion velocity distributions in short-pulse-heated solids via x-ray Doppler shifts,” resubmitted August 2022, under review at *Physical Review Letters*.
4. **B. F. Kraus**, A. Chien, L. Gao, K. W. Hill, M. Bitter, P. C. Efthimion, H. Chen, M. B. Schneider, A. Moreau, R. Hollinger, S. Wang, H. Song, and J. J. Rocca, “Comparing plasma conditions in short-pulse-heated foils via fine-structure x-ray emission,” *Review of Scientific Instruments* 92, 033525 (2021). doi:10.1063/5.0043524.
5. M. Bitter, N. Pablant, K. W. Hill, L. Gao, **B. F. Kraus**, P. C. Efthimion, L. Delgado-Aparicio, B. Stratton, M. Schneider, F. Coppari, R. Kauffman, M. J. MacDonald, A. MacPhee, Y. Ping, S. Stoupin, and D. Thorn, “A new class of focusing crystal shapes for Bragg spectroscopy of small, point-like, x-ray sources in laser-produced plasmas,” *Review of Scientific Instruments* 92, 043531 (2021). doi:10.1063/5.0043599.
6. P. M. King, K. Miler, N. Lemos, J. L. Shaw, **B. F. Kraus**, M. Thibodeau, B. M. Hegelich, J. Hinojosa, P. Michel, C. Joshi, K. A. Marsh, W. Mori, A. Pak, A. G. R. Thomas, and F. Albert, “Predominant contribution of direct laser acceleration to high-energy electron spectra in a low-density self-modulated laser wakefield accelerator,” *Physical Review Accelerators and Beams* 24, 011302 (2021). doi:10.1103/PhysRevAccelBeams.24.011302.
7. L. Gao, **B. F. Kraus**, K. W. Hill, M. Bitter, P. C. Efthimion, M. B. Schneider, A. G. MacPhee, D. B. Thorn, J. Kilkenny, J. Ayers, R. Kauffman, H. Chen, and D. Nelson, “Absolute calibration of a time-resolved high resolution x-ray spectrometer for the National Ignition Facility (invited),” *Review of Scientific Instruments* 89, 10F125 (2018). doi:10.1063/1.5039340.
8. M. Bitter, K. W. Hill, L. Gao, **B. F. Kraus**, P. C. Efthimion, L. Delgado-Aparicio, N. Pablant, B. Stratton, M. Schneider, F. Coppari, R. Kauffman, A. G. MacPhee, Y. Ping, and D. Thorn, “A new toroidal x-ray crystal spectrometer for the diagnosis of high energy density plasmas at the National Ignition Facility,” *Review of Scientific Instruments* 89, 10F118 (2018). doi:10.1063/1.5036806.
9. **B. F. Kraus** and Y. Raitses, “Floating potential of emitting surfaces in plasmas with respect to the space potential,” *Physics of Plasmas (letter)* 25, 030701 (2018). doi:10.1063/1.5018335.
10. **B. F. Kraus** and S. R. Hudson, “Theory and discretization of ideal magnetohydrodynamic equilibria with fractal pressure profiles,” *Physics of Plasmas*, 24, 092519 (2017). doi:10.1063/1.4986493.

Synergistic Activities

- Journal referee for: *Journal of Applied Physics*, *Physics of Plasmas*, *Plasma Sources Science and Technology*, *Plasma Physics and Controlled Fusion*, and *AIP Advances*
- Referee for Princeton Collaborative Low Temperature Plasma Research Facility proposal call
- Tour Guide for Science Education Dept., Princeton Plasma Physics Laboratory
- Assistant Instructor, Graduate Laboratory in Plasma Physics under Prof. Samuel Cohen
- Princeton University Graduate Student Government, Plasma Physics Representative (2016-2019)