William Coogan

Personal Data

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Education

2018 PhD in Mechanical and Aerospace Engineering, Princeton University
Dissertation: "Thrust Model for an Applied-Field Lorentz Force Accelerator"

2015 MA in Mechanical and Aerospace Engineering, Princeton University

2013 BS in Physics, Minor in Mathematics, Indiana University | Gpa: 3.90/4.00
Honors Thesis: "Analysis of Monte Carlo Comparison Methods for W + n-jet and Vector Boson Fusion Processes"
Departmental Honors, Highest Distinction

2011 MM in Computer Music Composition, Indiana University | Gpa: 3.83/4.00

2008 MM in Music Composition, Western Washington University | Gpa: 3.98/4.00

2007 BM in Music Composition, Western Washington University | Gpa: 3.77/4.00
Cum Laude

Work Experience

2013-Present

Graduate Researcher at Electric Propulsion and Plasma Dynamics Laboratory, Princeton, NJ

Lithium Lorentz Force Accelerator (LiLFA)

I am working to advance the technology readiness level of the LiLFA, a new form of plasma propulsion for spacecraft, by addressing questions of plasma reattachment to spacecraft and the thrust generating mechanism provided by the applied magnetic field on the LiLFA. My work has included the following tasks:

- Invention and testing of two new diagnostics, both of which outperform the previous state-of-the-art method
  - Dynamic resistance probe: measures plume divergence and mass flux
  - Applied-field component thrust stand: specifically targets measurement of a single component of thrust, which is crucial for thrust model verification
- Compliance with safety procedures for dealing with lithium (very reactive) in all phases of matter, including use of supplied-air breathing apparatus, bunny suits, fire-resistant clothing, and calibration and maintenance of hydrogen detectors
- Maintenance of 5 m vacuum vessel and pumps, including complete pump rebuild and designing and building windows and feed-throughs
- All electrical work for diagnostics and power, totaling 100 kW
- Supervision of all undergraduates (1-2 per year) working on the LiLFA

2011-2013 | Owner at Coogan Carpentry, LLC, Bloomington, IN
Contractor and Carpenter
I managed all aspects of the business, including advertising, consultation with clients, drafting of building plans, bidding for work, and construction.

2008-2009 | Logistics Agent at Expeditors International of Washington, Inc., Bensenville, IL
Freight Forwarder
I worked as a logistics agent responsible for tracking and tracing John Deere equipment to Australia and South America. I made sure all customs forms and packing declarations were filled out appropriately. My training included dangerous goods certified.

Honors, Awards, and Affiliations

2016-Present	AIAA Student Member
2016-2017	Program in Plasma Science and Technology Fellowship, Princeton Plasma Physics Laboratory
2016	2nd Place, Princeton Mechanical and Aerospace Engineering Research Day
Summer 2016	Program in Plasma Science and Technology Fellowship, Princeton Plasma Physics Laboratory
2015-2016	Program in Plasma Science and Technology Fellowship, Princeton Plasma Physics Laboratory

Publications

Coogan, W. J., Hepler, M. A., and Choueri, E. Y., "A Method for Measuring the Applied-Field Thrust Component of Plasma Thrusters," *Journal of Propulsion and Power*, Submitted for Publication.

Coogan, W. J., Hepler, M. A., and Choueri, E. Y., "Direct Measurement of the Applied-Field Component of the Thrust of a Lithium Lorentz Force Accelerator," In 52nd AIAA Joint Propulsion Conference, Salt Lake City, UT, 25-27 July, 2016. AIAA-2016-4537.

Hepler, M. A., Coogan, W. J., Ilardi, B. L., and Choueri, E. Y., "Liquid-Metal Mass-Flow Measurement by an Inductive Proximity Detector for Use in Conjunction with a $\mathbf{J} \times \mathbf{B}$ Pump," In 52nd AIAA Joint Propulsion Conference, Salt Lake City, UT, 25-27 July, 2016. AIAA-2016-4536.

Coogan, W. J., Hepler, M. A., and Choueri, E. Y., "Dynamic Resistance Probe for the Measurement of the Mass Deposition Rate from a Condensible Propellant Thruster," In 34th International Electric Propulsion Conference, Hyogo-Kobe, Japan, 4-10 July, 2015. IEPC-2015-199.

Teaching Assistant Experience

Fall 2016	Engineering Design, MAE 321
Spring 2016	Space Systems Design, MAE 342
Fall 2015	Thermodynamics, MAE 221
Spring 2015	Engineering Dynamics, MAE 206
Fall 2014	Thermodynamics, MAE 221

Presentations

"Direct Measurement of the Applied-Field Component of the Thrust from a Lorentz Force Accelerator"
Mechanical and Aerospace Engineering Research Day
September 16, 2016

"New Thrust Model for the Applied-Field Lorentz Force Accelerator"
Electric Propulsion and Plasma Dynamics Lab Talk Series, Oral Presentation
August 31, 2016

"Direct Measurement of the Applied-Field Component of the Thrust of a Lithium Lorentz Force Accelerator"
Joint Propulsion Conference, Oral Presentation
July 25, 2016

"Liquid Metal Mass Flow Measurement for a $\mathbf{J} \times \mathbf{B}$ Pump Feed System"
Joint Propulsion Conference, Oral Presentation
July 25, 2016

"Thrust Model for a Lithium Lorentz Force Accelerator"
PhD Committee Meeting
April 13, 2016

"MW-Level Nuclear Power Generation for Spacecraft"
Electric Propulsion and Plasma Dynamics Lab Talk Series, Oral Presentation
October 14, 2015

"Dynamic Resistance Probe for the Measurement of the Mass Deposition Rate from a Condensible Propellant Thruster"
International Electric Propulsion Conference, Oral Presentation
July 8, 2015

"Thrust Model for a Lithium Lorentz Force Accelerator"
General Examination, Research Component, Oral Presentation
May 5, 2015

"Plume Characterization of a Lithium Lorentz Force Accelerator"
Electric Propulsion and Plasma Dynamics Lab Talk Series, Oral Presentation
April 20, 2015

"State of the Art Update for Applied-Field Magnetoplasmadynamic Thrusters"
Research Report for Princeton University's Mechanical and Aerospace Engineering Faculty, Oral Presentation
with Mike Hepler
November 11, 2014

"Thrust Measurement Methods for High-Power Steady-State Plasma Thrusters"
Electric Propulsion and Plasma Dynamics Lab Talk Series, Oral Presentation
June 26, 2014

"Chaos and Striation Formation in Neon Plasma"
Research Report at Princeton Plasma Physics Laboratory, Oral Presentation
with Ge Dong and Eugene Evans
April 2, 2014

"Lithium Feed System Alternatives for the Lithium Lorentz Force Accelerator"
Electric Propulsion and Plasma Dynamics Lab Talk Series, Oral Presentation
October 2, 2013

Languages

English:	Fluent
Spanish:	6 years
French:	3 years
Russian:	1 year