

Mohamed Zaghoo
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Laboratory for Laser Energetics
University of Rochester

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Education

Harvard University	Cambridge, MA
PhD in Applied Physics	May 2017
A.M. in Physics	May 2013
University of Illinois Urbana-Champaign	Champaign, IL
B.Sc. in Physics, Highest Distinction	2008-2010

Research and Academic Appointments

Laboratory for Laser Energetics	Rochester, NY
Research Associate at the High-Energy Density group	2017-present
Lyman laboratory of Physics	Cambridge, MA
Doctoral Research Assistant at Prof. Silvera's group	2012-2017
Max Planck Institute for Quantum Optics	Garching, Germany
Visiting Researcher at Prof. Immanuel Bloch group	Feb –May 2011
Stanford University	Stanford, CA
Visiting Researcher, Geballe Laboratory for Advanced Materials	May-Sept 2010
Massachusetts Institute of Technology	Cambridge, MA
Kavli Institute for Astrophysics & Space Research	
Research assistant on the NASA swift mission	Sum. 08 & winter 09

Selected honors and distinctions

Harvard University “Meet the scholar” Spring series talks, “Jupiter on the bench”: <i>The first non-faculty speaker in 3 years</i>	2017
NASA Earth & Space Science Fellow at Harvard	2014-2017
The Goldman Sachs Fellow at Harvard	2015
Distinction and Excellence in Teaching Award	2015
Robert Bosch Stiftung Fellowship to the 62nd Lindau Nobel Laureates meeting, Young researcher award	2012
The 2009 MIT ASO Undergraduate Achievement Award for “outstanding Achievement and exceptional professional promise” <i>Featured at MIT News, Illinois Physics news</i>	2009

Publications

Zaghoo M. *New thermodynamic constraints on internal, thermal and magnetic states of Super-Earths*, In Review **Astrophys. J.**, 2019

Karasiev V.V, Hu S., **Zaghoo M.**, & T.R. Boehly *Exchange-correlation thermal effects in shocked deuterium: Softening the principal Hugoniot and thermophysical properties*, Submitted to **Phys. Rev. B**, 2019

Zaghoo M. et al. *Breakdown of Fermi-degeneracy in the simplest liquid metal*, **PRL**, 122, 085001, 2019

Zaghoo M. & Collins G.W. *Size & Strength of self-excited Dynamos in extrasolar Jupiter-like planets*, *Astrophys. J.*, 862, 19, 2018

Zaghoo M. *Dynamical conductivity and partial ionization in dense fluid hydrogen*. *Phys Rev. E.*, 97 (4), 043205, 2018

Zaghoo M., Husband R & Silvera I.F. *Striking Isotope effect in the Metallization phase line of Liquid Hydrogen and Deuterium*, **Phys. Rev. B.**, 98,104102, 2018

Zaghoo M. & Silvera I.F. *Conductivity and dissociation in Metallic hydrogen: Implications for planetary interiors*. *Proc. Nat. Acad. Sci.* 10 (1073), 2017

Silvera, I.F., Dias, R., Noked, O. & **Zaghoo, M.** *Metallic hydrogen*. *J. Low Temp Phys.* (2017); 187 (1).

Zaghoo M., Salamat A., Silvera I.F. *Evidence of a first order transition to metallic hydrogen*. *Physical Review B*, 93 (15) 2016

Dzyabura V., **Zaghoo M.**, Silvera I.F. *Evidence of a liquid-liquid transition in hot dense hydrogen*. *Proc. Nat. Acad. Sci.* 110 (20), 2013

Selected Press & Popular science coverage

“Building a planet on Earth”, **All about space magazine**, 2018

“Settling Arguments About Hydrogen With 168 Giant Lasers”, **NYTimes**, 2018

“Metallic hydrogen in the spotlight”, **Nature Materials**, 2017

Also featured in Harvard Gazette, Harvard SEAS, Science News, Physics Today, Scientific American, DailyGalaxy, Chemistry world, Milenio noticias, Spacedaily, Phys.org, Noticiadelasciencia and others.

Research Grants & Laser beam time

PI on the I-MJDD EOS of D2 at the National Ignition Facility at LLNL (2018-2020)

Co-I on DOE Office of science, Award Number DE-SC0019269 “Converging toward Atomic and Nuclear Pressures” DE-FOA-0001801 grant (2018-2021)

Co-I on the 2019 DOE Laboratory for Basic Science grant “shocked Methane at Icy giants’ internal conditions” (2018-2019)

Co-I on the 2019 DOE Laboratory for Basic Science grant “Broadband reflectivity platform development at the OMEGA facility” (2018-2019)

PI on the NASA planetary science NNX14AP17H grant (2015-2017)

Invited talks and conferences

Invited Astrophysics Colloquium, University of Rochester	Oct 2018
Invited HED colloquium, Lawrence Livermore National Laboratory	Nov 2018
Invited talk at the APS, Division of Plasma Physics	Nov 2018
Invited talk at the Gordon Research Conference	July 2018
Research & Review colloquium at the Laboratory for Laser Energetics	Oct 2017
Contributed talk at the APS, Division of Plasma physics	Oct 2017
Invited talk at the HED summer school in San Diego	Aug 2017
Invited poster talk, DOE SSAP symposium	Apr 2017
Invited lunch talk at MIT Center for Ultra-cold atoms	Feb 2017
Harvard Graduate Commons fireside chat	Feb 2017
<u>Harvard SEAS's researcher of the month podcast</u>	Jul 2016
<i>https://soundcloud.com/harvard/evidence-of-a-first-order-phase-transition-to-metallic-hydrogen</i>	
Harvard Physics Wednesday night seminar	Oct 2015
Invited talk, Gordon Research Seminar on high pressure	Jun 2015
Invited talk in the 2013 AIRPAT in Seattle	Aug 2013

Awards

Harvard Merit Scholarship	2011-2012
KAUST International Global Discovery Scholarship	2008-2010
Tau Sigma National Honor Society	2008-2010
The UIUC Anthony Summer Fellow at CERN	2009
The UIUC best Physics Thesis poster Award	2010
Egypt's <u>LEAD national Scholarship</u>, one of Egypt's most prestigious scholarships for "exceptional young leaders"	2005-2008

Research Interests

High-energy density physics, plasma physics, interior model structure and heat transport models of Solar and extrasolar planets, dynamic compression, metallic hydrogen, phase transitions and transport coefficients of warm dense matter, ultrafast spectroscopy of dense systems,