

ENAM A. CHOWDHURY

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Material Science and Engineering
Electrical and Computer Engineering
Physics
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Prof. Chowdhury is a leading expert in the field of short pulse lasers and laser damage, ultra-intense and high energy density laser matter interaction. His lab recently demonstrated photon acceleration in non-linear metasurfaces pumped by ultrashort mid-IR pulses [2]. He led the design and construction of the 400 TW SCARLET laser system at the OSU High Energy Density Physics (HEDP) Laboratory [13], which was completed in 2012 [Laser focus world cover June 2012]. Along with development of SCARLET, he concentrated on research on intense laser accelerated multi-MeV particles from liquid targets in kHz repetition rate [11]. In 2012, he established a new AFOSR funded laboratory devoted to studying femtosecond laser matter interaction near material damage threshold, which has concentrated on how laser damage mechanisms evolve from traditional near IR to mid IR wavelengths [4]. His ongoing experimental efforts on various Few cycle pulse [1,3] and multi-pulse effects [8] already show traditional models like Two Temperature Model (TTM) developed for near IR laser solid interaction may not be adequate, and new wavelength scaled paradigm may be necessary to explain intense laser solid interaction at longer wavelengths.

EDUCATION

A.B. (Physics) Wabash College, Indiana 1995
M.S. (Electrical Engineering) University of Delaware, 1999
Ph.D. (Physics) University of Delaware, 2004

PROFESSIONAL EMPLOYMENT

Research Associate Professor of Physics, OSU 08/18-08/19
Research Assistant Professor of Physics, OSU, 03/13-08/18
Consultant for the Air Force Research Laboratory, Dayton 2013-present
Senior Research Associate, OSU Physics. 12/06-02/13
Post Doctoral Researcher, 05/04-11/06

HONORS AND AWARDS

Chowdhury Lab had been selected to be the short pulse damage testing laboratory for the SPIE Laser Damage Symposium 2015-2016, Boulder International Damage Competition, where the leading manufacturers in the world compete to showcase the damage resistance performance of their optics.

Group Leader for Ultrahigh Field Science, invited talk, "Introduction to Ultra-intense field Physics" at Gordon Research Conference: Multiphoton Processes 2014

ACTIVITIES

Organizer and co-Chair, FIERO (Frontiers In Extreme Relativistic Optics) AFOSR funded Workshop, Columbus OH, 2013, Member CLEO Science and Innovation Light-Matter Interactions and Materials Processing program committee, Member SPIE Laser Damage Program Committee, Member SPIE Pacific

RELEVANT PUBLICATIONS

1. Noah Talisa, Enam Chowdhury, “Few cycle pulse laser ablation study of single layer TiO₂ thin films using time resolved surface microscopy”, *Optics Express*, 26 (23), 30371 (2018). (Editor’s pick)
2. M. R. Shcherbakov, K. Werner, Z. Fan, N. Talisa, E. Chowdhury, and G. Shvets, “Nonlinear manifestations of photon acceleration in time-dependent metasurfaces: tunable broadband harmonics generation,” *Nature Communications*, no. 2019, pp. 1–15, 2017. (<https://doi.org/10.1038/s41467-019-09313-8>)
3. Kyle R. P. Kafka, Noah Talisa, Gabriel Tempea, Drake R. Austin, Catalin Neacsu and Enam A. Chowdhury, Few-cycle pulse laser induced damage threshold determination of broadband optics, *Optics Express* 24, 28858 (2016).
4. O. Sergaeva, V. Gruzdev, D. Austin, E. Chowdhury, “Ultrafast excitation of conduction-band electrons by high-intensity ultrashort laser pulses in band-gap solids: Vinogradov equations vs Drude model”, *JOSA B* 35 (11) 2895-2905 (2018).
5. Drake Austin, K. Kafka, Y. Hai, Z. Wang, C. I. Blaga, Enam A. Chowdhury, “Femtosecond laser damage of germanium from near to mid-IR wavelengths”, *Opt. Lett.* 43(15), 3702-3705 (2018).
6. Kevin Werner, Michael G. Hastings, Aaron Schweinsberg, Brian L. Wilmer, Drake Austin, Christopher M. Wolfe, Miroslav Kolesik, Trenton R. Ensley,- Laura Vanderhoef, Anthony Valenzuela, and Enam Chowdhury, “Ultrafast mid-infrared high harmonic and supercontinuum generation with n₂ characterization in zinc selenide”, *Optics Express* 27, 2867 (2019). <https://doi.org/10.1364/OE.27.002867>
7. K. R. P. Kafka, D. R. Austin, H. Li, A. Y. Yi, J. Cheng, and E. A. Chowdhury, *Time-resolved measurement of single pulse femtosecond laser-induced periodic surface structure formation induced by a pre-fabricated surface groove*, *Optics Express* 23, 19432 (2015).
8. Drake R. Austin, Kyle R. P. Kafka, Simeon Trendafilov, Gennady Shvets, Hui Li, Allen Y. Yi, Urszula B. Szafruga, Zhou Wang, Yu Hang Lai, Cosmin I. Blaga, Louis F. DiMauro, and Enam A. Chowdhury, *Laser induced periodic surface structure formation in germanium by strong field mid IR laser solid interaction at oblique incidence*, *Optics Express* 23, 19522 (2015)
9. Robert A. Mitchell, Douglass W. Schumacher, and Enam A. Chowdhury, *Modeling crater formation in femtosecond-pulse laser damage from basic principles*, *Opt. Lett.* 40, 2189 (2015)
10. Robert A. Mitchell; Douglass W. Schumacher; Enam Chowdhury, “*Modeling femtosecond pulse laser damage using particle-in-cell simulations*”, *Opt. Eng.* 53, 122507 (2014)
11. Patrick Poole, Simeon Trendafilov, Gennady Shvets, Douglas Smith, and Enam Chowdhury, “*Pulse-width dependent femtosecond damage threshold measurements for pulse compression gratings*”, *Opt. Ex.* 21, 26341 (2013).
12. John Morrison, Scott Feister, Kyle Frische, Drake Austin, Gregory Ngirmang, Chris Orban, Enam Chowdhury, W. M. Roquemore. “MeV proton acceleration at kHz repetition rate from ultra-intense laser liquid interaction,” *Fast Track Communication at New Journal of Physics* 20 022001 (2018).
13. S. Palaniyappan, A. DiChiara, E. Chowdhury, A. Falkowski, G. Ongadi, E. L. Huskins, and B. C. Walker, “*Ultrastrong Field Ionization of Neⁿ⁺ (<=8): Rescattering and the Role of the Magnetic Field*”, *Phys. Rev. Lett.* 94, 243003 (2005)
14. P. L. Poole, C. Willis, R. L. Daskalova, K. M. George, S. Feister, S. Jiang, J. Snyder, J. Marketon, D. W. Schumacher, K. U. Akli, L. Van Woerkom, R. R. Freeman, and E. A. Chowdhury, “*Experimental capabilities of 0.4 PW, 1 shot/min Scarlet laser facility for high energy density science*”, *Applied Optics* Vol. 55, pp. 4713-4719 (2016)

COLLABORATORS (LAST 4 YEARS)

D. W. Schumacher (OSU), L. F. DiMauro (OSU), W. M. Roquemore (AFRL/RQ), K. U. Akli (OSU), Emily Link (LLNL), Gennady Shvets (UT Austin), Glenn Daehn (OSU), , Jay Gupta (OSU), P. Agostini (The Ohio State University), Anthony Valenzuela (ARL), J. T. Morrison (Innovative Scientific Solutions, LLC), J. Nees (University of Michigan), C. Orban (The Ohio State University), J. Bromage (Laboratory for Laser Energetics), R. R. Freeman (The Ohio State University – Emeritus), V. Gruzdev (University of Missouri), C. I. Blaga (Kansas State University),