Chris Orban

CONTACT INFORMATION

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RESEARCH INTERESTS

Computational Physics, Laboratory and Astrophysical Plasmas, Physics Education Research, Large-Scale Structure of the Universe

EDUCATION

The Ohio State University, Columbus, OH, USA
Ph.D. Physics, March 2011

University of Illinois, Urbana-Champaign, IL, USA
B.S. Physics with Honors, December 2004

ACADEMIC AND WORK EXPERIENCE

The Ohio State University
Assistant Professor of Physics, Teaching Campus: Marion **2014-present**

Air Force Research Laboratory, Dayton, OH
Consultant to Extreme Light research group **2013-present**

Capital University, Columbus, OH
Adjunct Professor for Astronomy Course **Spring 2014**

The Ohio State University, High Energy Density Physics Research Group
Postdoctoral Researcher and Ugrad Research Advisor **2011 - 2013**

The Ohio State University, Department of Astronomy
Lecturer for Astro 1142: Black Holes **Spring, Summer 2013**

The Ohio State University, Department of Physics
Teaching Assistant (Grad-level Computational Physics) **Wi. Qtrs 2010-2012**
Teaching Assistant (introductory level) **Winter & Spring 2007, Fall 2009**

The Ohio State University, Center for Cosmology and Astroparticle Physics
Graduate Research Fellow **Summer 2007 - Fall 2010**

University of Illinois, Urbana-Champaign, IL, USA
Teaching Assistant **August 2002 - June 2004**
Undergraduate Research Student **January 2004 - December 2004**
Laser Facility Lab Assistant **June 2001 - December 2002**

HONORS AND AWARDS

Meggers Project Award from the American Institute of Physics to fund projects for the improvement of high school physics teaching ($25k)

Principal Investigator for STEMcoding @ OSU, A project funded by OSU extension's Connect & Collaborate grant ($40k)

Co-Creator of BuckeyeVR: Smartphone-based Virtual Reality Simulations for STEM classrooms, A STEAM-powered project at OSU ($12k)

Battelle Engineering, Technology and Human Affairs grant, Principal Investigator for "The Revolution in Cosmology and Fr. Georges Lemaitre's Hidden God" ($25k)

Air Force Office of Science Research (AFOSR) Summer Faculty Program. Summer 2016 & 2017. Project site: the Extreme Light research group at Wright-Patterson Air Force Base.

Department of Defense High Performance Computing Internship Program. Project title: *Developing Advanced Simulation and Analysis Capabilities for Investigations of "Extreme Light" Phenomena.* (Summer 2014, Summer 2015, Summer 2016, Summer 2017, Summer 2019)

University Fellowship, The Ohio State University, 2006

PAPERS

Porter, C. D., Smith, J. R. H., Stagar, E. M., Simmons, A., Nieberding, M., **Orban, C.**, Brown, J., and Ayers, A. "Using virtual reality in electrostatics instruction: the impact of training", submitted to the American Journal of Physics, available at `http://go.osu.edu/VRtraining`

Ngirmang, G. K., Morrison, J. T., George, K. M., Smith, J. R., Frische, K. D., **Orban, C.**, Chowdhury, E. A., Roquemore, W. M. "Experimental observation and computational modeling of radial Weibel instability in high intensity laser-plasma interactions" submitted to Nature Communications, available at `https://arxiv.org/abs/1910.12940`

Smith, J. R., Snapp, B., Madar, S., Brown, J. R., Fowler, J., Anderson, E., Porter, C. D., and Orban, C. "A Smartphone-Based Virtual Reality Plotting System for STEM Education" submitted to the math education journal PRIMUS

Orban, C. and Teeling-Smith, R. "Computational Thinking in Introductory Physics" accepted to The Physics Teacher, available at `https://arxiv.org/abs/1907.08079`

Smith, J. H. R., **Orban, C.**, Ngirmang, G. K., Morrison, J. T., George, K. M., Chowdhury, E. A., Roquemore, W. M. "Particle-in-Cell Simulations of Density Peak Formation and Ion Acceleration from Short Pulse Laser-Driven Ponderomotive Steepening" accepted to Physics of Plasmas. Manuscript available at `https://arxiv.org/abs/1905.00888`

Porter, C. D., Brown, J., Smith, J. H. R., Simmons, A., Nieberding, M., Ayers, A., **Orban, C.** "A controlled study of virtual reality in first-year magnetostatics" accepted to the proceedings of the 2019 Physics Education Research Conference, available at `https://arxiv.org/abs/1907.05567`

George, K. M., Morrison, J. T., Feister, S., Ngirmang, G., Smith, J.R.H., Klim, A., Snyder, J., Austin, D., Erbsen, W., Frische, K. D., Nees, J., **Orban, C.**, Chowdhury, E. A., Roquemore, W. M. "High repetition rate targets and optics from liquid microjets for the study and application of high intensity laser-plasma interactions" 2019, High Power Laser Science and Engineering, 7, e50

Nagayama, T., Bailey, J. E., Loisel, G. P., Dunham, G. S., Rochau, G. A., Blancard, C., Colgan, J., Cossé, Ph., Faussurier, G., Fontes, C. J., Gilleron, F., Hansen, S. B., Iglesias, C. A., Golovkin, I. E., Kilcrease, D. P., MacFarlane, J. J., Mancini, R. C., More, R. M., **Orban, C.**, Pain, J.-C., Sherrill, M. E., Wilson, B. G. "Systematic Study

of L-Shell Opacity at Solar Interior Temperatures", 2019, Physical Review Letters, 122, 23, 235001

Orban, C., Porter, C. D., Smith, J. R. H., Britt, C. A., Harper, K. A. "A Hybrid Approach for Using Programming Exercises in Introductory Physics" 2018, American Journal of Physics, 86, 831

Morrison, J. T., Feister, S. F., Frische, K. D., Austin, D. R., Ngirmang, G. K., Murphy, N. R., **Orban, C.**, Chowdhury, E. A. "MeV proton acceleration at kHz repetition rate from ultra-intense laser liquid interaction" 2018, New Journal of Physics, 20, 022001

Smith, J. R., Byrum, A., McCormick, T. M., Young, N., **Orban, C.**, Porter, C. D. "A controlled study of stereoscopic virtual reality in freshman electrostatics" 2017, Physics Education Research Conference Proceedings, pp. 376-379

Orban, C., Porter, C. D., Brecht, N. K., Teeling-Smith, R. M., Harper, K. A. "A novel approach for using programming exercises in electromagnetism coursework" 2017, Physics Education Research Conference Proceedings, pp. 288-291

Ngirmang, G. K., **Orban, C.**, Feister, S., Morrison, J. T., Chowdhury, E. A., Roquemore, W. M. "Particle-in-Cell Simulations of Electron Beam Production from Mid-Infrared Ultra-Intense Laser Interactions" 2017, Phys. Plasmas, 24, 103112

Feister, S., Austin, D. R., Morrison, J. T., Frische, K. D., **Orban, C.**, Ngirmang, G., Handler, A. , Smith, J. R., Schillaci, M., Chowdhury, E. A., Freeman, R. R., Roquemore, W. M. "Relativistic Electron Acceleration by mJ class kHz laser normally incident on liquid targets" 2017, Optics Express, 25, 16, 18736-18750

Ngirmang, G. K., **Orban, C.**, Feister, S., Morrison, J. T., Chowdhury, E. A., Frische, K. D., Roquemore, W. M. "3D PIC simulations of electron beams created via reflection of intense laser light from a water target" 2016, Phys. Plasmas, 23, 043111

Morrison, J. T., Chowdhury, E. A., Frische, K. D. , Feister, S., Ovchinnikov, V. M., Nees, J. A., **Orban, C.**, Freeman, R.R., and Roquemore, W.M. "Backward-propagating MeV electrons from 10^{18} W/cm^2 laser interactions with water" 2015, Phys. Plasmas, 22, 043101

Orban, C., Morrison, J.T., Chowdhury, E. D., Nees, J. A., Frische, K., Roquemore, W. M. "Backward-Propagating MeV Electrons in Ultra-Intense Laser Interactions: Standing Wave Acceleration and Coupling to the Reflected Laser Pulse" 2015, Phys. Plasmas, 22, 023110

Bailey, J. E., Nagayama, T., Loisel, G., Rochau, G. A., Blancard, C., Colgan, J., Cosse, P., Faussurier, G., Fontes, C.J., Gilleron, F., Golovkin, I., Hansen, S. B., Iglesias, C. A., Kilcrease, D. P., MacFarlane, J. J., Mancini, R. C., **Orban, C.** et al. "A Higher-than-Predicted Measurement of Iron Opacity at Solar Interior Temperatures", 2015, Nature, 517, 56-59

Feister, S., Nees, J. A., Morrison, J. T., Frische, K. D., **Orban, C.**, Chowdhury, E., and Roquemore, W. M. "A Novel Femtosecond-Gated, High-Resolution, Frequency-Shifted Shearing Interferometry Technique for Probing Pre-Plasma Expansion in Ultra-Intense Laser Experiments" 2014, Rev. of Sci. Inst., 85, 11D602

Orban, C. "Cosmological Perturbation Theory as a Tool for Estimating Box-Scale

Effects in N-body Simulations" 2014, Phys. Rev. D, 90, 023509

Storm, M., Eichman, B., **Orban, C.**, Jiang, S. *et al.* "X-ray Imaging of Laser-Irradiated, Limited-Mass Zirconium Foils" 2014, Phys. Plasmas, 21, 072704

Storm, M., Jiang, S., Wertpny, D., **Orban, C.**, *et al.* "Fast Neutron Production from Li Converters and Laser-driven Protons" 2013, Phys. Plasmas, 20, 5

Orban, C. "Keeping it Real: Revisiting a Novel Approach to Running Ensembles of Cosmological N-body Simulations", 2013, JCAP, 5, 32

Akli, K.U., **Orban, C.**, Schumacher, D., Storm, M., Fatenejad, M., Lamb, D., Freeman, R.R. "Coupling of High Intensity Laser Light to Fast Electrons in Cone-guided Fast Ignition" 2012, Phys. Rev. E, 86, 065402

Orban, C., Weinberg, D.H., "Self-similar Bumps and Wiggles: Isolating the Evolution of the BAO peak with Power-Law Initial Conditions" 2011, Phys. Rev. D., 84, 063501

Orban, C., Gnedin, O. Y., Weisz, D. R., Skillman, E. D., Dolphin, A. E., & Holtzman, J. A. "Delving Deeper into the Tumultuous Lives of Galactic Dwarfs" ApJ, 2008, 686, 1030

Li, H., Shengtai, L., Koller, J., Wendroff, B.B., Liska, R., **Orban, C.**, Liang, E.P.T., and Lin, D.N.C., "Potential Vorticity Evolution Produced by an Embedded Protoplanet," 2005, ApJ, 624, 1003.

PRESS/MEDIA

Computer science now counts as a math credit in most states – is this a good idea? Chris Orban, The Conversation October 2019, Available at `https://go.osu.edu/CSsub`

Podcast interview: *Voices of Excellence from Arts and Sciences Podcast.* Available at `https://soundcloud.com/voices_arts_sciences/orban`

Podcast interview: *STEMcoding: Reimagining STEM education with Chris Orban and Richelle Teeling-Smith* Learning Unboxed podcast. Available at `http://go.osu.edu/learningunboxed`

Featured article: *STEMcoding youtube channel celebrates 1-year anniversary, 2000 subscriber milestone* Available at `http://go.osu.edu/stemcodinganniversary`

Featured article: *Computer Programming at Whetstone Library: Workshop Brings Kids up to Code* Available at `http://go.osu.edu/libraryworkshops`

Featured article: *The classes of the future are now* Available at `https://www.osu.edu/features/2018/the-classes-of-the-future-are-now.html`

Featured article: *OSU physics researchers' VR expertise is virtually unmatched* Available at `https://go.osu.edu/vrarticle`

Featured article: *OSUM professor opens door to supercomputing.* Marion Star (April 6, 2015). Available at `http://www.marionstar.com/story/news/local/2015/04/05/osum-professor-opens-door-supercomputing/25344199/`

Interviewed for *Ohio Supercomputer Center Still Evolving.* Columbus Dispatch (April 7, 2013). Available at `http://www.dispatch.com/content/stories/science/2013/`

04/07/2-ohio-supercomputer-center-still-evolving.html

Ohio Supercomputer Center. (March 2013). Press Release. *Simulations uncover obstacle to harnessing laser-driven fusion.* Available at https://www.osc.edu/press/simulations-uncover-obstacle-to-harnessing-laser-driven-fusion

Ohio Supercomputer Center. (July 2011). Press Release. *Scientists model physics of key dark-energy probe.* Available at http://www.osc.edu/press/releases/2011/orban.shtml

OTHER ACTIVITES

Highschool I/O hackathon presenter	2018-
Metro HS coding club faculty advisor	2018-
Ohio Dept. of Ed. Computer Science Advisory Committee	2018
NSF Cyberlearning Review Committee	2018
Columbus library coding workshop leader	2017-
Science Member of Ohio Standards Revision Working Group	2017-2018
Led physics prep. for OSU diversity enhancement program (YSP)	2016-2018
History of Cosmology speaker for Astronomy on Tap Columbus	2016-2017
Reviewer for New Journal of Physics	2019
Reviewer for NSF/DOE Partnership in Basic Plasma Science and Engineering	2016
Reviewer for Ohio Supercomputer Center (OSC) Allocations Committee	2015-2016
"Physics of Video Games" project leader for OSC summer program	2015-2017
Reviewer for Nature physics	2014-2017
Science Fair Judge	2009-2016
Perkins Observatory New Vistas in Astronomy Guest Speaker	July 2013
Reviewer for Canadian Journal of Physics	2012
Reviewer for High Energy Density Physics	2012-2015
Reviewer for Open Access Journal of Photoenergy	2017-2018
Reviewer for Computers and Mathematics with Applications	2018