

Mark E. Koepke, mark.koepke@mail.wvu.edu, 304-293-4912 (campus office)

Ph.D. 1984, Physics, M.S. 1980, Physics, B.S. (honors) 1978, Physics, Astronomy (double major), all at Univ. Maryland, College Park, MD. Country of Citizenship: U.S.

### **Employment**

2021-present: Vice President for R&D: Tokamak Energy Inc. 2020-2021, Tokamak Energy Ltd.  
1987-present: Assistant/Associate/Full Prof of Physics, West Virginia Univ., Morgantown, WV  
1986-87: Assistant Professor (Research), Dept. of Nuclear Engineering, U. Washington, Seattle  
1984-86: Senior Research Associate (F. Ribe), Dept. of Nuclear Engineering, U. Washington  
Summer 1977: NASA Goddard Space Flight Center; Summer 1978: LLNL (A Division)

### **Professional Affiliations and Accreditation**

WVU Distinguished Scholar, APS Distinguished Lecturer in Plasma Physics, WVU Byrd Professor, Mercator Fellow at Ruhr University-Bochum (Germany), Guest Professor at Univ. Innsbruck (Austria)+Univ. Kiel (Germany)+Univ. Greifswald (Germany). Affiliated Professor at Royal Inst. of Technology (KTH) Stockholm 2007-2010, Visiting Scholar at Univ. Oxford (2020-2021) & at Imperial College-London (2020-2021), Visiting Prof at U. Strathclyde (Glasgow, UK) 2012-2026. Faculty Guest Researcher at SLAC (2019-24) & at LANL (2023-27).

Acting Director, Research Div., Office of Fusion Energy Science, US Dept of Energy (2010-11).  
Chair of DOE-SC-Fusion Energy Sciences Advisory Committee 2013-16. Chair of the FESAC Priorities Assessment and Budget Scenarios Panel's ten-year plan (2014).

APS-DPP Chair line (2011-2015). APS-GEC ExCom Chair line (2023-2027), APS-GEC Secretary line 2016-2018. Chair of DIII-D National Fusion Facility program advisory comm. (2013, 2014, 2015). OMEGA Laser User Group executive board: Member (2012-2021) and Chair line (2017-2021), Director, US Burning Plasma Organization (2016-2019).

Deputy Editor-in-Chief of *Plasma Phys. Contr. Fusion* (2005-present). U.S. Member of IUPAP-C16 (2003-2005 Associate Member; 2005-2008 Member)

DOE-NNSA *Center for Astrophysical Plasma Properties* (2018-2019) Member.

DOE-SC *Center for Predictive Control of Plasma Kinetics: Multi-phase and Bounded Systems* 2009-2014 Member; 2014-2019 Collaborating Institution.

*DIII-D Frontier Science Experiments Panel* (FY2017 and 2018).

*Lab for Laser Energetics - Cross-Beam Energy Transfer Platform on OMEGA*, FY 2018 member

**Research Interests:** Predictive control of plasma kinetics, interrelationship between plasma experiments in the lab and in space, space-weather processes, diagnostics/spectroscopy for magnetic fusion/inertial fusion/industrial partially ionized plasma, nonlinear dynamical complexity. Velocity shear-driven waves & instabilities in plasma, spectroscopic determination of plasma parameters applied to soft x-ray absorption spectra from radiatively heated Z-pinch plasma, plasma sheath dynamics, atomic kinetics, voltage-waveform-tailoring in high-frequency technological plasma, Theta/Z Pinch pulsed-power science, wave-wave and wave-particle interactions, dust/granule/nanoparticle tribology, and fusion pilot-plant design.

**Honors/Awards:** APS Fellow (since 2004), Institute of Physics Fellow (United Kingdom, since 2005), JSPS Fellow (Japan, since 2005), Mercator Fellow at Ruhr-Univ-Bochum since 2019. APS Distinguished Lecturer in Plasma Physics 2001-2002, WVU Robert C. Byrd Professor since 2005; WVU Benedum Distinguished Scholar Award 2001; WVU Outstanding Researcher 1996-1997; U.S. Office of Naval Research Young Investigator Award 1987.

APS Fellow citation (2004): For achievement in interrelating laboratory results and space-plasma observations, especially regarding the dramatic modification of instabilities by inhomogeneous plasma flow, and for influential experiments on driven-oscillator phenomena.

**PhD graduates supervised:** William Amatucci (PhD 1994), Valeriy Gavrishchaka (PhD 1996), James Carroll (PhD 1997), Daniela Strele (PhD, University of Innsbruck, 1998), Catalin Teodorescu (PhD 2002), Craig Selcher, PhD 2007, Sean Finnegan (PhD 2008), Eric Reynolds (PhD 2009), Paul Miller (PhD 2009), Michael I. Zimmerman (PhD 2010), Mattias Tornquist (PhD 2013), Jeff Walker (PhD 2015), James Franek (PhD 2017), Theodore Lane (PhD 2019), Steven Brandt (PhD 2020); Greg Riggs (PhD tentatively 2024).

**Select Publication List** (past 12 months)

Characterization of Quasi- Keplerian, Differentially Rotating, Free-Boundary Laboratory Plasmas, Authors: V Valenzuela-Villaseca, LG Suttle, F Suzuki-Vidal, JWD Halliday, S Merlini, DR Russell, ER Tubman, JD Hare, JP Chittenden, ME Koepke, EG Blackman, SV Lebedev. Phys. Rev. Lett. 130, 195101 (2023), published 12May2023.

Study of electric field oscillations in a magnetized plasma: Can we use the standard Langmuir probes for the measurements? Chengxun Yuan, Chen Zhou, M V Demidov, T Gyergyek, J Kovačič, M E Koepke, I P Kurlyandskaya, V I Demidov, S Costea and Zhongxiang Zhou,. IEEE Transaction on Plasma Science, December 2023 IEEE Transactions on Plasma Science PP(99)  
DOI:10.1109/TPS.2023.3337008. Published 2023

Role of Simple Spatial Gradient in Reinforcing the Accuracy of Temperature Determination of HED Plasma via Spectral Line-Area Ratios, Greg A. Riggs, Mark E. Koepke, Ted S. Lane, T. E. Steinberger, Patel Kozlowski, and Igor E Golovkin. MDPI, Atoms 2023, 11(7), 104, published 12 Jul 2023, <https://doi.org/10.3390/atoms11070104>.

Energetic electron transport in magnetic fields with island chains and stochastic regions, E.G. Kostadinova, D.M. Orlov, M. Koepke, F. Skiff and M.E. Austin, J. Plasma Phys. (2023), vol. 89, 905890420, published 4Sep2023 online

On The Structure of Plasma Jets in the Rotating Plasma Experiment, by V. Valenzuela-Villaseca, L. G. Suttle, F. Suzuki-Vidal, J. W. D. Halliday, D. R. Russell, S. Merlini, E. R. Tubman, J. D. Hare, J. P. Chittenden, M. E. Koepke, E. G. Blackman, S. V. Lebedev. IEEE Transactions on Plasma Science. To appear in print in 2024.

G. Riggs, M. Koepke, W. Heidbrink, M. Van Zeeland, and D. Spong, Time-resolved biphasic signatures of quadratic nonlinearity observed in coupled eigenmodes on the DIII-D tokamak, Phys. Plasmas (submitted Dec 2023).

On The Structure of Plasma Jets in the Rotating Plasma Experiment, by V. Valenzuela-Villaseca, L. G. Suttle, F. Suzuki-Vidal, J. W. D. Halliday, D. R. Russell, S. Merlini, E. R. Tubman, J. D. Hare, J. P. Chittenden, M. E. Koepke, E. G. Blackman, S. V. Lebedev. IEEE Transactions on Plasma Science. To appear in print in 2024.

Characterization of Quasi- Keplerian, Differentially Rotating, Free-Boundary Laboratory Plasmas, V Valenzuela-Villaseca, LG Suttle, F Suzuki-Vidal, JWD Halliday, S Merlini, DR Russell,, ER Tubman, JD Hare, JP Chittenden, ME Koepke, EG Blackman, SV Lebedev. Phys Rev Lett., published 12May2023.

Study of electric field oscillations in a magnetized plasma: Can we use the standard Langmuir probes for the measurements? Chengxun Yuan, Chen Zhou, M V Demidov, T Gyergyek, J Kovačič, M E Koepke, I P Kurlyandskaya, V I Demidov, S Costea and Zhongxiang Zhou,. IEEE Transaction on Plasma Science, December 2023 IEEE Transactions on Plasma Science DOI:10.1109/TPS.2023.3337008. Published 2023

Role of Simple Spatial Gradient in Reinforcing the Accuracy of Temperature Determination of HED Plasma via Spectral Line-Area Ratios, published Jul 2023 by Greg A. Riggs, Mark E. Koepke, Ted S. Lane, T. E. Steinberger, Patel Koslowski, and Igor E Golovkin. MDPI, Atoms 2023, 11(7), 104; <https://doi.org/10.3390/atoms11070104>.

Time-resolved biphasic signatures of quadratic nonlinearity observed in coupled Alfvén eigenmodes on the DIII-D tokamak, Phys. Plasmas 31, 042305 (2024) <https://doi.org/10.1063/5.0195036>

Energetic electron transport in magnetic fields with island chains and stochastic regions, Published 04 September 2023, E.G. Kostadinova, D.M. Orlov, M. Koepke, F. Skiff and M.E. Austin. J. Plasma Physics.

Detection of Optogalvanic Spectra Using Driven Quasi-Periodic Oscillator Dynamics, Koepke, M. E. (submitted 2024)