



**Wednesday
February 18, 2026
3:10 pm
Room 1003 EECS**

Prof. G.W. Collins
University of Rochester

Extreme Matters, Pressure to Explore New Worlds, Exotic Solids, and Star Power

A science revolution is underway with the discovery of thousands of planets outside of our solar system, the creation of revolutionary materials, and the potential for harnessing fusion energy. Unlocking these discoveries hinges on our ability to understand and manipulate matter to and beyond atomic pressures, conditions that alter the nature of atoms themselves. At such conditions our intuition for matter begins to breakdown, with hydrogen becoming a metal and perhaps a superconducting superfluid, water becoming superionic where protons flow through a compact oxygen crystal, and unbound electrons getting squeezed interior to core orbitals of an atom. I will show how laboratory laser experiments are opening this science frontier at light speed, revealing how we might make transparent aluminum-like in Star Trek, a new exploration into the nature and implications of planets-potential platforms for life throughout the universe, and controlled thermonuclear fusion. You might take a look at one of our videos as a primer to our discussion

(<https://www.youtube.com/watch?v=NqabT21d8VM>).

About the Speaker: Gilbert 'Rip' Collins is Tracy Hyde Harris Professor of Mechanical Engineering and Physics and Astronomy, and Associate Director for the Laboratory for Laser Energetics at the University of Rochester. He received his Ph.D. in Physics from Ohio State University. From 1989 to 2016, he held positions at Lawrence Livermore National Laboratory, including Group Leader, Physics Associate Division Leader, Director for the Center for High Energy Density Physics, and Distinguished Member of the Technical Staff. Rip works with a world-class team of scientists exploring the nature and implications of matter at conditions where external forces overwhelm the quantum forces of the atom and the microphysics leading to thermonuclear fusion. He is the Director of the NSF Physics Frontier Center for Matter at Atomic Pressures. He holds visiting Professorships at Oxford University and the University of Edinburgh. He is a recipient of the Bridgman Award, APS Fellow, AAAS Fellow, APS Award for Excellence in Plasma Physics, DOE Weapons Recognition of Excellence Award, NNSA Award for Excellence for Stockpile Stewardship Program, and NNSA Science and Technology Award.