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Michigan Institute for Plasma Science and Engineering

Joint CLaSP/MIPSE Seminar

Thursday
September 14, 2023
3:30 pm
Room 2246 CSRB

Prof. Ali H. Sulaiman

University of Minnesota

The Giant Planets as Unique Laboratories for Space Plasma Processes

This talk will introduce space plasma processes in the environments of giant planets and explore them through the lens of spacecraft measurements. The aim is to present a high-level overview of what we learn about planetary environments by virtue of such measurements, both remotely and in situ. Plasma waves are responsible for the energization and heating of charged particles and energy transport in the environments of giant planets. They play a central role in auroral and radiation belt dynamics, moon/ring coupling with the magnetosphere, and driving atmospheric loss.

The environments of giant planets also provide unique access to the extremities of the parameter space to explore fundamental plasma physics, not seen anywhere else in the solar system. An example is the low-altitudes of Jupiter, where the plasma is ultra-magnetized ($f_{ce}/f_{pe} \sim 10^3 – 10^4$). Another is the heliocentric distances of the orbits of giant planets, where the Mach numbers can exceed 100, affording opportunities to experimentally test limits of wave-particle interactions and collisionless shock wave theory, respectively.

About the Speaker: Ali H. Sulaiman joined the School of Physics and Astronomy at the University of Minnesota in 2022. He received his Ph.D. in Space Physics at Imperial College London in 2016. His research specializes in the physics of plasma waves in gas giant systems, and their critical role in the dynamics of their auroras, magnetospheres, and ionospheres. His research portfolio is built on his involvement in NASA's *Juno* mission to Jupiter, NASA/ESA's *Cassini-Huygens* mission to Saturn and ESA's future *Jupiter Icy Moons Explorer mission* to Jupiter. Ali was the recipient of the 2019 University of Iowa Postdoctoral Scholar Excellence Award, the 2017 International Union of Radio Science Young Scientists Award, and the 2016 Springer Thesis Prize (Recognizing Outstanding PhD Research).