



**Wednesday
December 4, 2024
3:00pm
Room 1018 Dow**

Prof. Marien Simeni

University of Minnesota

Picosecond Optical Sum-Frequency Generation Enabling Fundamental Studies in Plasmas and at Interfaces with Materials

Highly sensitive, space-time resolved electric field vector measurements are essential for addressing numerous critical questions across nearly all sub-fields of plasma physics. These measurements are crucial for understanding edge-localized mode plasma instabilities in tokamaks, unraveling surface streamers and ionization wave dynamics, analyzing surface charging in low-temperature plasmas, gaining insights into magnetic reconnection events, and validating fundamental sheath theories under different collisionality regimes. In this talk, I will present a novel laser-based approach for electric field measurements that offers exceptional sensitivity across multiple orders of magnitude and is suitable for both high and low pressure plasmas. Additionally, I will demonstrate how this setup can simultaneously perform gas density measurements, providing reduced electric field estimates. We anticipate that this newly developed approach will be applicable to a wide variety of plasma physics sub-fields, making electric field measurements more accessible and straightforward.

About the Speaker: Marien Simeni is an Assistant Professor at the Mechanical Engineering Department of the University of Minnesota (UMN), where he started in April 2022. His research group focuses on the development of ultrafast laser diagnostics to unravel kinetic mechanisms and energy transfers in non-equilibrium and laser-produced plasmas as well as in reactive flows. Marien received his B.S. in physics from Ecole Normale Supérieure Cachan (France) in 2009, his M.S. in aerospace engineering from Ecole Centrale Paris (France) in 2011 and his Ph.D. in aerospace engineering from the same institution in 2015. He subsequently held a postdoctoral position at the Ohio State University (2015-2018), a research associate position at UMN (2018-2020) and an associate research physicist position at the Princeton Plasma Physics Laboratory (2020-2022).