



HYPHI COLLOQUIUM

Date: 28 Nov 2025, Friday

Time: 10:30 Hrs (Tea/Coffee 10:15 Hrs)

Venue: TIFRH Auditorium

Title: HyPhI Meets High Intensity: ICUIL, ALLS and the Frontier of Nonlinear THz Spectroscopy

Speaker: Tsuneyuki Ozaki, INRS-EMT, Canada

Abstract:

Ultra-intense lasers have opened new regimes of light–matter interaction, from relativistic plasmas to strong-field dynamics in solids. In this talk, I will first introduce the International Committee on Ultra-High Intensity Lasers (ICUIL), and then the Advanced Laser Light Source (ALLS) near Montreal (Canada), a user facility that delivers intense (up to 0.75 PW) femtosecond near-IR pulses, as well as secondary sources in the extreme ultra-violet (XUV) and terahertz (THz) domains. I will then focus on our recent work on intense and nonlinear THz spectroscopy of semiconductors, where sub-cycle THz fields approaching hundreds of kV/cm to MV/cm drive intervalley scattering, impact ionization and strong modifications of carrier transport. Using large-aperture photoconductive antennas and air-plasma THz sources, we observe pronounced nonlinear transmission and high-frequency THz generation in materials such as InGaAs and InSb, supported by Monte-Carlo and rate-equation modelling. These results illustrate how intense THz pulses provide a powerful, tabletop platform for probing and controlling ultrafast carrier dynamics relevant to future THz electronics and photonics.