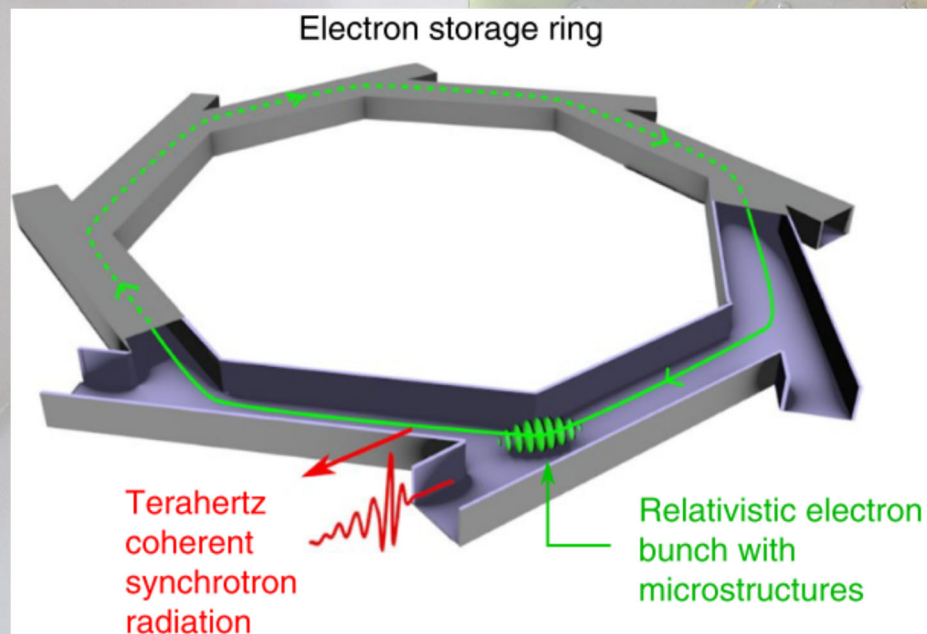


YNU研究拠点「テラヘルツ・ナノ光科学研究拠点」・
物理工学コース共催 講演会

Single-shot THz detection in synchrotron facilities

テラヘルツコヒーレントシンクロトロン放射のシングルショット検出とカオス理論に基づく電子バンチの非線形電子ダイナミクス制御についてお話いただきます！



講師： **Prof. Serge Bielawski**

(Univ. Lille, France)

日時：2022年11月15日（火）

11:00～12:00

場所：工学研究院

総合研究棟W202

Abstract: In synchrotron radiation facilities, including Free-Electron Lasers, a key point is to characterize, understand, and control the shape of the relativistic electron bunches which are responsible for the emission of synchrotron radiation. Indeed, electron bunches are complex media experiencing subtle dynamics effects. This includes instabilities leading to the appearance of “patterns” in their longitudinal profile, that leads to intense bursts of THz radiation (often exceeding 10000 times classical synchrotron radiation). We present here measurement techniques that have been developed for measuring the emitted THz pulses (at the SOLEIL storage ring), and also for probing the Coulomb field in the vicinity of electron bunches (at KARA and European XFEL). Key to these THz measurements is the development of laser-based single-shot electro-optic methods with high acquisition rates (above 1 million of THz signals recorded per second), sub-picosecond resolution, and long acquisition windows. These combined challenges led to new designs based on strategies, known as photonic time-stretch, and Diversity Electro-Optic Sampling (DEOS) [1]. In addition to their interest for synchrotron radiation facilities, the developed single-shot and real-time techniques are expected to also find applications in purely table-top THz spectroscopy. We also address the problem of control [2] of these instabilities, using feedback control strategies inspired by chaos theory.

[1] E. Roussel et al., *Light: Science & Applications*, 11, 14 (2022)

[2] C. Evain et al., *Nature Physics* 15, 635–639 (2019).