

第 95 回ナノ・スピン工学研究会の開催について

日時：2017 年 12 月 4 日(月) 15:30~17:00

場所：片平キャンパス 電気通信研究所ナノ・スピン実験棟 4 階 A401 室

講演題目：THz Studies of Dirac-Like Fermions in Graphene-Like HgCdTe Structures

講師：クナップ ヴォイチェック (KNAP, Wojciech) 教授, フランス・国立科学中央研究所—モンペリエ第 2 大学

講師紹介：Prof. Wojciech Knap got his Ph.D in 1985 at Univ. Warsaw, Poland, and Habilitation in condensed matter physics in 1997 at Univ. Montpellier II, France. After accumulating academic carriers in Poland and France, he joined CNRS-Univ. Montpellier II, France in 1992, having been a Research Director since 2001. He was awarded as a JSPS Research Fellow and spent a year at Tohoku University in 2007-2008. His main scientific interests are: i) Terahertz properties of semiconductors, ii) Quantum phenomena in transport and iii) Terahertz Plasmons in low dimensional structures. He authored and co-authored more than 100 peer-reviewed journal papers.

講演概要: Effect of carriers heating and terahertz (THz)/Far infrared (FIR) magnetically tunable emission were subject of intense studies for decades. Impressive results have been obtained using GaAs and InSb semiconductors leading to the design of cyclotron resonance (CR) emitters based THz/FIR spectrometers. Recent emergence of extremely high crystalline quality MBE grown HgCdTe alloys with extremely narrow band gap and even Dirac-like linear energy spectra raises questions about band structure related modification of electron heating and hope for THz cyclotron emission of high efficiency and tunability. Indeed, decrease of the band gap and the cyclotron mass may lead to magnetic field tunability, greater by an order of magnitude than the one in GaAs or InSb semiconductors and non-equidistant Landau Levels (LLs) may help in decreasing of the parasitic self-absorption phenomena.

In this lecture we present a general introduction to graphene-like HgCdTe structures follow by experimental results on magnetically tunable THz emission from several HgCdTe bulk layers with extremely narrow energy band gaps (below 50meV). A good agreement between theoretical curves and experimental results demonstrates that emission from our samples can indeed be attributed to the CR excitations in the conduction band. We have also performed preliminary

experiments with lower energy bandgaps (going to zero) expecting higher tunability and efficiency of THz emission. Surprisingly we have observed decrease or complete absence of THz emission. Our results leads to discussion: if and how electric heating of electrons is modified when tuning the HgCdTe energy band structure towards Dirac-like one?

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The 95th Nano-Spin Engineering Seminar

*Date:*4th December, 2017. (Monday)

*Time:*15:30 ~ 17:00

Place: A401, RIEC Nano-Spin Laboratory Building, Katahira-Campus

Title of Lecture: "THz Studies of Dirac-Like Fermions in Graphene-Like HgCdTe Structures"

Lecturer: Dr. Wojciech KNAP, Professor, University of Montpellier & CNRS, Montpellier, France

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