

# 「フロンティア機能性物質創製センター」 オープンセミナーのご案内

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「フロンティア機能性物質創製センター」では、オープンセミナーを開催しております。  
第11回は、P. Wzietek 博士(Laboratoire de Physique des Solides, Université Paris-Sud, Orsay, France)にご講演をお願いしました。多くの方々のご来聴をお待ちしています。

兵庫県立大学「フロンティア機能性物質創製センター」  
オープンセミナー(第11回)

講師 : **Pawel Wzietek 博士**  
(Laboratoire de Physique des Solides,  
Université Paris-Sud, Orsay, France)

**“NMR investigation of the Pressure induced transition from Mott insulator to Superconductor in the Cs<sub>3</sub>C<sub>60</sub> isomeric compounds”**

**Abstract:** The A<sub>3</sub>C<sub>60</sub> metallic compounds has for long been considered as metals close to regular Fermi liquids displaying superconducting BCS behavior. Among various evidences many come from NMR studies: the Pauli-like normal state electronic susceptibility as measured by NMR Knight shift and  $T_1T$  data, the decrease of Knight shift in the superconducting state as expected for singlet pairing, and finally the observation of the Hebel-Slichter coherence peak pointing towards a conventional s-wave superconductivity. On the other hand, the marked increase of  $T_c$  with the inter-ball distance and some other experimental observations led to conjectures on the role of electron correlations enhanced by a Jahn-Teller distortion in these materials. The debate on this issue has been reopened by the recent discovery of two fulleride Cs<sub>3</sub>C<sub>60</sub> isomeric phases which present the most expanded lattice in this family and which also happen to be Mott insulators at ambient pressure. In fact, although superconductivity involves an electron-phonon coupling, the electronic correlations are of primary importance for enhancing the  $T_c$  values, as had been anticipated from DMFT calculations. I will present NMR experiments performed in the A15 and fcc-Cs<sub>3</sub>C<sub>60</sub> phases for increasing hydrostatic pressure through the transition from a Mott insulator to a superconductor. These measurements clearly indicate the existence of a 3D Mott transition to a superconducting state in this family. Our findings are consistent with theoretical models which emphasize the role of the coulomb correlations and the Jahn-Teller distortion that lifts the multi-orbital molecular state degeneracy in these materials [1].

[1] P. Wzietek *et al.*, Phys. Rev. Lett. **112**, 066401 (2014).

日時 : 2014 年 8 月 28 日 (木曜日)

16:00 ~ 17:30

場所 : 兵庫県立大学理学部

研究棟談話室 739 室