



GP-Spin Seminar

# “Spin-orbitronics for Green IT devices”

日時： 2016年11月30日（水）  
13:00-15:00

場所： 工学研究科マテリアル・開発系  
教育研究棟会議室(202室)

講演者： Prof. Dr. Mathias Kläui  
Institute of Physics and Materials Science  
Johannes Gutenberg University Mainz  
Visiting Professor IMR, Tohoku University



## Abstract:

In our information-everywhere society IT is a major player for energy consumption and novel spintronic devices can play a role in the quest for Green IT. Reducing power consumption of mobile devices by replacing volatile memory by fast non-volatile spintronic memory could also improve speed and a one-memory-fits-all approach drastically simplifies the architecture design.

However there are key requirements for the implementation of future spintronic devices: (i) large read-out signals, (ii) stability of the magnetic information and (iii) fast and efficient manipulation.

Spin – orbit effects can provide mechanisms that enable all three, thus leading to novel device concepts. Fundamentally, the relativistic spin-orbit interaction couples electron's momentum and spin and it can lead to a range of effects when the system is brought out of equilibrium for instance by applying electric fields. Combining ultimately stable topological skyrmion spin structures with ultimately efficient manipulation using spin-orbit torques we present the fundamentals that enable novel devices, such as the skyrmion racetrack that relies on spin-orbit effects.

S. Woo et al., Nature Mater. 15, 501 (2016); F. Büttner et al., Nature Phys. 11, 225 (2015); K. Litzius et al., Nature Phys. (in press (2016)); arxiv:1608.07216; T. Seifert et al., Nature Photon. 10, 483 (2016).

