

Seminar of Sadamichi Maekawa

RIKEN Center for Emergent Matter Science, Japan

Monday 22nd June, 2026 – 11:00 AM
IJL- Room 4-A014

Power Spintronics

The flow of electron spins, the so-called “spin current”, is a key concept in the recent progress in spintronics [1,2]. In ferromagnetic metals and semiconductors, the spin current interacts with magnetization by the exchange interaction and induces the motion of the magnetization due to the angular momentum conservation, the so-called spin transfer torque. Its inverse effect is called the spin-motive force which is the electric voltage generated by the magnetization dynamics due to the energy conservation between electrical current and magnetization [2,3]. The spin motive-force is derived by introducing spin Berry phase in the Faraday’s law of electro-magnetism. Spin current is induced and manipulated by heat [4] and mechanical motion [5-7] as well. The interconversion between various energies through spin current, the so-called “power spintronics”, will be discussed.

- [1] “Spin Current” eds. S. Maekawa, et al. (Oxford University Press, 2012 and 2017),
- [2] S. Maekawa, T. Kikkawa, H. Chudo, J. Ieda and E. Saitoh: J. Appl. Phys. 133, 020902 (2023).
- [3] S.E. Barnes and S. Maekawa,: Phys. Rev. Lett. 98, 246601 (2007),
- [4] K. Uchida, S. Maekawa, et al: IEEE Proc. 104, 1946 (2016),
- [5] R. Takahashi, S. Maekawa, et al.: Nature Phys. 12, 52 (2016),
- [6] R. Takahashi, S. Maekawa, et al.: Nature Commun. 11, 3009 (2020).
- [7] J. Fujimoto, S. Maekawa, et al., Phys. Rev. B103, L220404 (2021) and PNAS Nexus 3 547 (2024).



Professor Sadamichi Maekawa is a renowned condensed matter physicist and a pioneer in the field of spintronics. He received his Doctor of Science degree from Tohoku University in 1975 and has made groundbreaking contributions to the theory of strongly correlated electron systems, spin transport, and magnetic nanostructures. His research has significantly advanced the understanding of spin-dependent phenomena and their applications in modern information technologies. Professor Maekawa has held numerous leadership positions, including Director of the Advanced Science Research Center at the Japan Atomic Energy Agency and Senior Advisor at the RIKEN Center for Emergent Matter Science. He is currently Professor Emeritus at Tohoku University and serves as Science and Technology Advisor to the Minister of Defense of Japan. His scientific excellence has been recognized through many prestigious honors, including the IUPAP Magnetism Award and Néel Medal, the Humboldt Award, the Honda Memorial Award, and fellowship in the American Physical Society. A Clarivate Highly Cited Researcher, Professor Maekawa remains one of the most influential figures in condensed matter physics and spintronics worldwide.

Séminaire organisé dans le cadre du programme interdisciplinaire MAT-PULSE



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