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## Magnetic Skyrmions – Novel spin textures for spintronics functionalities

*Thursday, 6 June 2019 09:30 (1 hour)*

In this talk I give an overview primarily on chiral magnetic skyrmions –two-dimensionally localized topological magnetization solitons –in B20 magnets, films of B20 magnets, transition-metal films and heterostructures. Taking a multiscale approach from quantum mechanics of electrons, over atomistic spinmodels to micromagnetism, I draw a line of thought from the electronic structure, to the spin-orbit interaction, the magnetic spin-texture, the stability of skyrmions, and to their coexistence with antiskyrmions and bobbars. I discuss the potential and the role of Heisenberg-type exchange frustration for the properties of skyrmions followed by the recent progress made in the field of skyrmionics, i.e. skyrmions as entity of information, which have to fit to the field of spintronics, in size, ambient temperature, injection, transport, detection and manipulation at reasonable fields and currents. I look into the materials dimensions for skyrmions, the choice of heterostructures of synthetic antiferromagnets, the role of interfaces and the role of impurities. I look into the topological orbital moment of skyrmions, the Hall effects and the tunneling spin-mixing magneto-resistance as means of single skyrmion detection. Skyrmions might be only the beginning of localized magnetization textures. I may give a perspective of three-dimensional magnetic textures localized on the nanometer scale.

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**Session Classification:** Dynamics of magnetic textures: domain walls, vortices and Skyrmions

**Track Classification:** Quantum theories of spin-structures and spin-textures