Unconventional Magnetism Seminars

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Disordered skyrmion phase stabilized by magnetic frustration in a chiral magnet

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Magnetic skyrmions are vortex-like topological spin textures often observed to form a hexagonal close packed arrangement in structurally chiral ferromagnets with finite Dzyaloshinskii-Moriya interaction. Recently, β-Mn structure-type Co-Zn-Mn alloys were identified as a new class of chiral magnet to host such skyrmion phases, while β -Mn itself is known to host an elemental geometrically frustrated spin liquid. In this talk we discuss the discovery that the intermediate composition system $Co_7Zn_7Mn_6$ is a unique host of two disconnected, thermal-equilibrium topological skyrmion phases; one is a conventional skyrmion crystal phase stabilized by thermal fluctuations and restricted to exist just below the magnetic transition temperature T_c, and the other is a novel three-dimensionally disordered skyrmion phase that is stable far below T_c. The stability of this new disordered skyrmion phase is proposed to be driven by a cooperative interplay between the chiral magnetism with Dzyaloshinskii-Moriya interaction and frustrated magnetism inherent to β -Mn.