Magnetism with and without magnetism : Different regimes of magnetic interactions in quantum gases

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The talk will address different regimes of magnetic interactions in ultracold quantum gases. The spin dependent contact interaction of ultracold atoms can lead to surprising collective behavior of e.g. fermionic atoms in optical lattices and in bulk [1, 2]. Recently artifcial gauge fields even allowed to study magnetic like interactions for completely non-magnetic atoms [3, 4] and to simulate strong external magnetic fields which eventually allow to realize high-B-field physics like the Hofstadter butterfly.

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[1] Krauser *et al*, Nature Physics **8**, 813 (2012).
[2] Krauser *et al*, Science **343**, 157 (2014).
[3] Struck *et al*, Science **333**, 996 (2011).
[4] Struck *et al*, Nature Physics **9**, 738 (2013).