

## **Spin-dependent gauge fields in atomic gases**

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Gauge fields are ubiquitous in Physics. For example, in the context of high energy physics, they are the fundamental carrier of forces; while in condensed matter systems the associated physical fields (electrical and magnetic) are essential in creating and understanding many-body phenomena. These fields can depend on internal — spin — degrees of freedom, and in material systems these spin-dependent gauge fields are often manifest as spin-orbit coupling (SOC, but more correctly spin-crystal momentum coupling).

Here I present our experimental work synthesizing SOC for ultracold neutral atoms. I will first show how we use the light-matter interaction to engineer gauge terms in the atomic Hamiltonian, and then how to make these depend on spin.