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Off-site driven spin exchange interaction in a dipolar band insulator.[1] LAURIANE CHOMAZ, SIMON BAIER, DANIEL PETTER, ALEXANDER PATSCHNEIDER, JAN HENDRICK BECHER, GABRIELE NATALE, MANFRED MARK[2], FRANCESCA FERLAINO[3], Univeristt Innsbruck —
Ultracold gases of highly magnetic atoms such as erbium offer an ideal platform for investigating novel aspects of many-body quantum phenomena in the presence of dipole-dipole interactions. We have realized and studied tunable spin mixtures of fermionic erbium 167. Our achievements rely on a lattice protection technics, which enable, for the preparation time, to turn off the scattering processes between the atoms. In this poster I will present our study of spin dynamics of the fermi gas in a deep lattice prepared in distinct spin states. Our experimental tunability enables us to prepare unit filling samples of fermions in the lattice lowest band and to change the atoms internal state to a pure spin state of higher quantum number. A magnetization-conserving flip-flop dynamics shows a resonant behavior with the relative detuning of the neighboring spin states, which we can experimentally tune thanks to quadratic Zeeman and light shifts. We investigate the characteristic dependences of the dynamics on resonance, with the spin state quantum number and with the quantization axis.

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