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Er-Li: A little explored quantum gas mixture with unique opportunities

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One of the most important challenges for fermionic systems in optical lattices is the quest for low temperatures. Only at temperatures below a few percent of the Fermi temperature, correlation lengths become sizeable. This is the regime in which the system behaves highly collective, and where new quantum phases are expected to emerge. Despite significant progress in recent years, the required temperatures have remained out of reach in optical lattices. Here, we present a new experiment with a mixture of erbium and lithium atoms designed for optimized sympathetic cooling in optical lattices. We discuss the unique features of this surprisingly little explored mixture and present the current status of our new experimental setup designed to challenge the low-temperature frontier and to explore quantum many-body dynamics in new regimes.

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