

Quantum simulation with ultracold atoms

Quantum gases of neutral atoms cooled down to the nanokelvin scale provide a powerful technological platform to manage quantum information and build quantum simulators of ideal condensed-matter models for studies of fundamental physics. A primary tool for this possibility is represented by optical lattices, i.e. perfectly ordered “crystals of light” generated by laser standing waves, which allow the possibility of accurately tuning the effects of interactions between the particles, the amount of disorder and the system dimensionality. Some of the latest developments in this field obtained in recent experiments at LENS with ultracold multi-component fermionic gases will also be presented.