
Guided atom optics

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Résumé

In this talk, I will describe some recent advances in the field of guided atom optics. In the first part, I will explain the experimental techniques that allow for the realization of a transversally monomode guided atom laser. These systems are the equivalent for matter waves of monomode fibers in optics. In the second part of the talk, I will comment on a few experiments performed with this system. We have realized a distributed Bragg reflector for matter waves where the succession of layers is provided by here b a finite size optical lattice. We will explain how the interaction between the matterwave and the optical lattice with an inhomogeneous envelope can be described in terms of transmission through effective thin tunnel barriers. The scattering on an amplitude modulated optical lattice provides a new method to engineer the momentum distribution of the matter wave and to realize, for instance, ultra selective velocity filters. In the last part of the talk, I will describe other recent experiments where the transverse of degrees of freedom in the guide play an important role. We will give an example with the interaction of an off-center defect that can trigger a transition to chaos in this system. Another example will be discussed on the very first experiments dealing with the realization of a guided matter wave beam splitter.

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