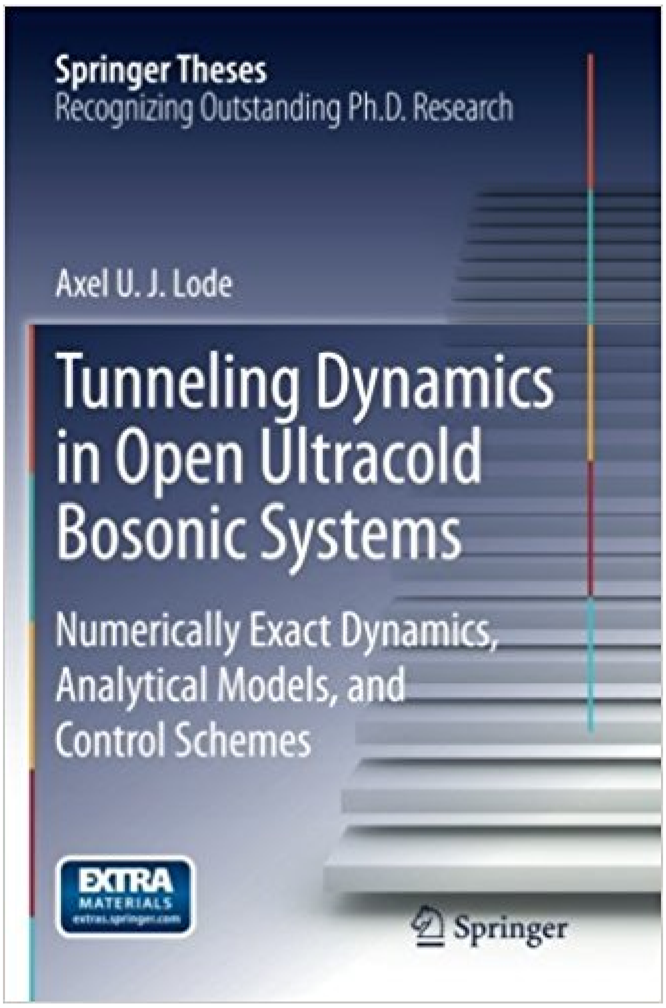
Tunneling Dynamics In Open Ultracold Bosonic Systems: Numerically Exact Dynamics Ã¢â‚¬â€œ Analytical Models Ã¢â‚¬â€œ Control Schemes (Springer Theses)



Synopsis

This thesis addresses the intriguing topic of the quantum tunnelling of many-body systems such as Bose-Einstein condensates. Despite the enormous amount of work on the tunneling of a single particle through a barrier, we know very little aboutÃ Â how a system made of several or of many particles tunnels through a barrier to open space.Ã Â The presentÃ Â work usesÃ Â numerically exact solutions of the time-dependent many-boson SchrÃƒÂ¶dinger equation to explore the rich physics of the tunneling to open space process in ultracold bosonic particles that are initially prepared as a Bose-Einstein condensate and subsequently allowed to tunnel through a barrier to open space. The many-body process is built up from concurrentlyÃ Â occurring single particle processes that are characterized by different momenta. These momenta correspond to the chemical potentials of systems with decreasing particle number. The many-boson process exhibits exciting collective phenomena: the escaping particlesÃ Â fragment and lose their coherence with the source and among each other, whilst correlationsÃ Â build upÃ Â within the system. The detailed understanding of the many-body process is used to devise and test a scheme to control the final state, momentum distributions and even the correlation dynamics of the tunneling process.

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This outstanding (based on reading only the Sample) work is definitely on this liberal arts grad’s "To Buy" list. Alas, there it must ’bide until the publisher offers it a more affordable price ($1 per page, my word) or Fortuna favors with a substantial treasure.

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