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Sommario/riassunto	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 about how a system made of several or of many particles tunnels through a barrier to open space. The present work uses numerically exact solutions of the time-dependent

many-boson Schrödinger 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 concurrently 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 particles fragment and lose their coherence with the source and among each other, whilst correlations build up 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.