Title:	Coherent quantum state transfer in ultra-cold chemistry
Authors:	Modak, Subhrajit (/jspui/browse?type=author&value=Modak%2C+Subhrajit)
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Abstract:	Creation and manipulation of cold molecules from atomic Bose–Einstein condensate has opened up a new dimension to study chemical reactions at ultra-cold temperature, known as ‘superchemistry,’ which is extremely useful for the quantum control of matter wave reaction at ultra-cold temperature. Here, a coherent quantum state transfer of atomic to molecular condensate is demonstrated, mediated by solitonic excitation in the mean-field geometry. It is observed that the induced photoassociation is found to control the velocity of these excitations, which in turn controls the chemical reaction fronts. Cooperative many-body effects of photoassociation on Lieb mode have also been studied through molecular dispersion, revealing degeneracy and bistable behavior. Furthermore, it is observed that the photoassociation-induced molecular energy shows oscillatory behavior, analogous to the classical reaction process.
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