Correlation Effects in the Quench-Induced Phase Separation Dynamics of a Two-Component Ultracold Quantum Gas\textsuperscript{1} SIMEON MIS-TAKIDIS, GARYFALLIA KATSIMIGA, University of Hamburg, PANAYOTIS KEVREKIDIS, University of Massachusetts, PETER SCHMELCHER, University of Hamburg, THEORY GROUP OF FUNDAMENTAL PROCESSES IN QUANTUM PHYSICS TEAM — We explore the quench dynamics of a binary Bose-Einstein condensate crossing the miscibility-immiscibility threshold and vice versa, both within and in particular beyond the mean-field approximation. Increasing the interspecies repulsion leads to the filamentation of the density of each component, involving shorter wavenumbers and longer spatial scales in the many-body approach. These filaments appear to be strongly correlated and exhibit domain-wall structures. Following the reverse quench process multiple dark-antidark solitary waves are spontaneously generated and subsequently found to decay in the many-body scenario. We simulate single-shot images to connect our findings to possible experimental realizations. Finally, quenches within the miscible and the immiscible regime are discussed.

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