Abstract Submitted
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Formation of matter-wave soliton trains by modulational instabillity[1] JASON H. V. NGUYEN, DE LUO, RANDALL G. HULET, Rice University — Matter-wave soliton trains were initially observed following an interaction quench in a condensate of ^{7}Li atoms[2]. The solitons in the train were observed to interact repulsively, an indication of a phase difference of π between neighboring solitons. Although the formation of soliton trains can be understood as resulting from a modulational instability, an explanation for the observed phase-structure remains elusive. We study the formation of soliton trains by characterizing modulational instability across a wide range of scattering lengths. We find universal scaling laws for the number of solitons created by the quench and for the decay in atom number. Through minimally-destructive imaging, we observe real-time dynamics, and show that soliton trains are created with an alternating phase structure, rather than evolving into one.

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[2]K.E. Strecker, G.B. Partridge, A. G. Truscott, & R. G. Hulet, Nature 417, 150 (2002).

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