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Structure formation in immiscible two–species Bose–Einstein condensates in perturbed harmonic traps ROBERT PATTINSON, NICK PARKER, NICK PROUKAKIS, Joint Quantum Centre Durham-Newcastle, School of Mathematics and Statistics, Newcastle University, Newcastle upon Tyne, United-Kingdom, I-KANG LIU, SHIH-CHUAN GOU, Department of Physics, National Changhua University of Education, Changhua, Taiwan, SIMON GARDINER, DANIEL MCCARRON, HUNG-WEN CHO, SIMON CORNISH, Joint Quantum Centre Durham-Newcastle, Department of Physics, Durham University, Durham, United-Kingdom, TOM BILLAM, Jack Dodd Centre for Quantum Technology, Department of Physics, University of Otago, Otago, New-Zealand — We investigate the mean–field equilibrium solutions for a trapped two–species ^{87}Rb–^{133}Cs immiscible Bose–Einstein condensate, and show that the density profiles observed in a recent Bose-Einstein experiment (D. J. McCarron *et al.* Phys. Rev. A 84, 011603 (2011)), which include ball and shell formations and axially/radially separated states, can be reproduced when accounting for weak linear perturbations. We also demonstrate the importance of the coupled growth of the two condensates by a simple finite temperature model which reveals such structures to be generally metastable in the presence of dissipation, with our findings confirmed by the more accurate Stochastic Projected Gross–Pitaevskii equation.

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