

Abstract Submitted
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Non-local dark solitons in dipolar condensates¹ MATTHEW EDMONDS, Okinawa Institute of Science and Technology, THOMAS BLAND, NICK PARKER, Newcastle University — Dark solitons are fundamental one-dimensional excitations supported in defocussing nonlinear media, and have been observed and studied extensively in the atomic Bose-Einstein condensates. In dipolar condensates, for which the constituent atoms possess large magnetic moments, the conventional isotropic, local nonlinearity is supplemented by anisotropic, non-local nonlinearity [1]. Here we establish the properties of dark solitons in dipolar condensates, from their family of solutions and collision dynamics in homogeneous systems [2,3,4] to their oscillations in trapped condensates [5]. The non-locality of the dark soliton leads to a plethora of unconventional and intriguing behaviours, including density ripples around the soliton core, bound states and interaction-dependent oscillations. REFERENCES: [1] T. Lahaye, et al, Rep. Prog. Phys. 72, 126401 (2009) [2] K. Pawłowski and K. Rzazewski, New J. Phys. 17, 105006 (2015) [3] T. Bland, M. J. Edmonds, N. P. Proukakis, A. M. Martin, D. H. J. O’Dell and N. G. Parker, Phys. Rev. A 92, 063601 (2015) [4] M. J. Edmonds, T. Bland, D. H. J. O’Dell and N. G. Parker, Phys. Rev. A 93, 063617 (2016) [5] T. Bland et al., arXiv:1610.02002 (2016)

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