Matter Rogue Waves

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Abstract:

We describe excitation and evolution of deterministic rogue waves in Bose-Einstein condensates either loaded into a parabolic trap or embedded in an optical lattice. In the latter case, rogue waves can be observed in condensates with a positive scattering length. The rogue waves are immensely enhanced by the lattice: local atomic density may increase up to tens times. We extend the theory to binary mixtures of the condensates where inter-atomic dramatically affect the existence of rogue waves (compared to the situation when only one of the respective components is present). Different dynamical regimes in the presence of linear interspecies coupling are described. Ways of experimental excitation of rogue waves are discussed.