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Uniqueness of Ground States for fractional Nonlinear Schrödinger Equations

Ground states play an eminent role in our rigorous understanding of solitary waves and blowup for dispersive equations with focusing nonlinearity. Indeed, many key results in this area depend on fundamental properties of ground states such as their uniqueness, radial symmetry as well as the so-called nondegeneracy of the linearized operator. In the well-studied case of classical NLS/NLW, all these issues have found a satisfactory answer by using classical elliptic theory and techniques from ordinary differential equations. However, the current status of affairs about ground states for "fractional" NLS (involving fractional powers of the Laplacian) is mainly open. In this talk, I will present a new result that enters this "terra incognita," by proving the uniqueness and radial symmetry of ground states for a certain class of fractional NLS, which arise in astrophysics. Time permitting, I will discuss some applications too.

This is partly joint work with Rupert Frank (Princeton).