

**ON THE LONG-TERM DYNAMICS OF NONLINEAR WAVE  
EQUATIONS AND THE UNIQUENESS OF SOLITONS**

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We will discuss the problem of existence and uniqueness of nonzero solutions of finite energy to semilinear elliptic PDEs. The uniqueness question, which is often delicate, has consequences for the spectral properties of the linearized operators. This in turn is of essence for the long-term dynamics of solutions. In particular, I will describe recent work with Alex Cohen and Kevin Li at Yale on the uniqueness of the first few excited states for the cubic problem in three dimensions.