

# **Nonlinear Schrödinger equations and related systems**

Catherine Sulem

Department of Mathematics, University of Toronto

Two main features characterize the nonlinear dynamics of solutions to Nonlinear Schrödinger equations. They are (i) the phenomenon of wave collapse associated to the blowup of solutions and (ii) the existence of solitary waves. An important question associated to the existence of solitary waves is their stability, and more precisely their asymptotic stability referring to their long time behavior. On the other hand, the phenomenon of wave collapse corresponds to formation of small scales and the resulting breakdown of the modulational asymptotics. It appears as a basic mechanism of small-scale formation, even if it might be modified and even arrested by additional effects such as couplings, nonlinear dissipation, linear diffusive damping or saturated nonlinearities. Various open problems will be discussed.