In this lecture I introduce one of the most famous equations in physics: the nonlinear Schrodinger equation. I will give a definition of dispersion and I will explain how dispersion and nonlinearity come together to generate solitons.

I will give an idea of how we are able to determine if such an equation has solutions and how we learn about their properties in spite of the fact that we do not have an explicit formula for them. If time permits we will also look at this equation as an infinite dimension Hamiltonian system and at some of the properties that we can prove for it and that generalize what we know in the infinite dimension case.