

On Some Select Klein-Gordon and Beam Problems: Internal Modes, Fat Tails, Wave Collisions and Beyond

In this talk we revisit some very thoroughly studied (yet still quite entertaining!) problems involving kink-like structures in non-integrable systems starting with the Klein-Gordon models.

We will start from the prototypical model of the ϕ^4 class and discuss a bit its history of discoveries, successes and culprits as concerns the complex landscape of collisions of kinks and antikinks and its fractal features. We will briefly touch upon the recent developments in this vein, as well as the remarkable feature that after about 50 years of studies, there are still some fundamental questions remaining. We will then extend considerations to the case of higher order (ϕ^6 , 8, 10 and 12) models and present the particularities that each of these models bears, including the potential for numerous internal modes, fat tails and power law kink-antikink interactions among others.

Time permitting, we 'll also open up the problem towards the possibility of higher order dispersion and motivate such considerations from the perspective of recent optics problems. We will see how such higher order dispersion also creates interesting possibilities such as oscillatory tails, numerous kink-antikink bound states and their own complex interaction landscapes.