Karlsruhe Institute of Technology

Mini-Workshop “Analysis of PDEs”
March 27th - March 31st, 2023

10:00 - 11:00 am, Friday, March 31st 2023
Seminar room: SR 1.067, Math Building 20.30

The validity of the Derivative NLS approximation for systems with cubic nonlinearities

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Abstract

The (generalized) Derivative Nonlinear Schrödinger (DNLS) equation can be derived as an envelope equation via multiple scaling perturbation analysis from dispersive wave systems. It occurs when the cubic coefficient for the associated NLS equation vanishes for the spatial wave number of the underlying slowly modulated wave packet. It is the purpose of this paper to prove that the DNLS equation makes correct predictions about the dynamics of a Klein-Gordon model with a cubic nonlinearity. The proof is based on energy estimates and normal form transformations. New difficulties occur due to a total resonance and due to a second order resonance. We also present an analytic version of the theorem. This is joint work with Max Hess.