

*Department of Mathematics,
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Math 248 - Analysis Seminar

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Global, non-scattering solutions to the quintic, focusing semilinear wave equation on \mathbb{R}^{1+3}

Abstract:

We consider the quintic, focusing semilinear wave equation on \mathbb{R}^{1+3} , in the radially symmetric setting, and construct infinite time blow-up, relaxation, and intermediate types of solutions. More precisely, we first define an admissible class of time-dependent length scales, which includes a symbol class of functions. Then, we construct solutions which can be decomposed, for all sufficiently large time, into an Aubin-Talentini (soliton) solution, re-scaled by an admissible length scale, plus radiation (which solves the free 3 dimensional wave equation), plus corrections which decay as time approaches infinity. The solutions include infinite time blow-up and relaxation with rates including, but not limited to, positive and negative powers of time, with exponents sufficiently small in absolute value. We also obtain solutions whose soliton component has oscillatory length scales, including ones which converge to zero along one sequence of times approaching infinity, but which diverge to infinity along another such sequence of times. The method of proof is similar to a recent wave maps work of the author, which is itself inspired by matched asymptotic expansions.

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<https://ucsd.zoom.us/j/99515535778>
