POINTWISE CONVERGENCE OF THE KLEIN-GORDON FLOW

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Abstract. In this talk, we will deal with a nonlinear pointwise convergence theory for the case of the 3d cubic Klein-Gordon equation. In particular, we address the following question, considering the initial datum in $H^s(\mathbb{T}^3) \times H^{s-1}(\mathbb{T}^3)$: which is the minimal regularity s such that the solution of the aforementioned equation converges, as time goes to 0 and almost everywhere in space, to the initial datum? Departing from the well-known result for the linear setting (that is, such pointwise convergence holds true if and only if $s > 1/2$), we answer to the question in two different ways that lead us to two different minimal regularities:

(i) In a deterministic sense, we prove that the nonlinear counterpart of the aforementioned result for the linear flow holds true if and only if $s > 1/2$.
(ii) In a probabilistic sense, we lower the regularity assumption to $s > 0$ through a suitable randomization of the initial data.

This is a joint work with Renato Lucà.

Key words and phrases. Klein-Gordon equation, maximal estimates, smoothing estimates, random data.