Knocking out teeth in one-dimensional periodic NLS: Local and global wellposedness results

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In this talk local and global wellposedness results of the 1-dimensional nonlinear Schrodinger equation

$$iu_t - u_{xx} \pm |u|^{\alpha-1}u = 0$$

will be discussed with initial data $u_0 \in H^s(\mathbb{R}) + H^s(\mathbb{T})$ where $s \geq 0$, $\alpha \in [1, 5]$ and $\mathbb{T}$ is the one dimensional torus.

In the case of the cubic nonlinearity, $\alpha = 3$, local existence of weak solutions in the extended sense is shown through a differentiation by parts argument and in the case of the quadratic nonlinearity, $\alpha = 2$, global existence is established with the use of Strichartz type estimates and a conserved quantity argument.

References

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[2] L. Chaichenets, Dirk Hundertmark, P. Kunstmann and N. Pattakos, *On the global wellposedness of the quadratic NLS on* $L^2(\mathbb{R}) + H^1(\mathbb{T})$. arXiv:1904.04030 (2019), submitted to the Journal of Mathematical Analysis and Applications.