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# Sobolev Instability for the Cubic NLS on Irrational Tori

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**Abstract**

In the last two decades the study of instability in Sobolev spaces for nonlinear Hamiltonian partial differential equations on compact manifolds has drawn lots of attention in the mathematical community. A breakthrough result in this direction is due to Colliander-Keel-Staffilani-Takaoka-Tao (Invent. Math 2010), who showed the existence of solutions to the defocusing cubic NLS on the 2-dimensional square torus with arbitrarily small initial data and arbitrarily large high order Sobolev norms at later times. The mechanism to construct such unstable solutions is based on the study of the resonant dynamics of NLS. Staffilani noticed that the same strategy would not apply for the NLS equation on 2-dimensional irrational tori, where there are less resonant waves interactions. In this talk we discuss how we overcame this problem to prove Sobolev instability for the cubic NLS on irrational tori. Moreover, we present a recent result of this type where we also take into account the presence of smooth convolution potentials.