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Recurrent and diffusive dynamics for the NLS equation on tori

Small solutions of the NLS equation on tori may exhibit very different qualitative behavior. In order to illustrate this phenomenon, I will discuss various classes of special solutions for the NLS on the circle and on the two dimensional torus. On the one hand I shall prove existence of stable and unstable quasi-periodic solutions, on the other hand I shall study solutions which transfer energy to high Fourier modes. This analysis relies on the rich combinatorial structure of the Birkhoff Hamiltonian of the NLS.