## Peierls' theory of thermal conductivity and the method of quasisolutions

31.10
13:40-14:00

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In 1929 R. Peierls published his famous work [Pei29] devoted to the description of thermal conductivity in solids and derivation of the Fourier's law. He considered a lattice of anharmonic oscillators and showed at heuristic level of rigour that in the limit when the number of oscillators goes to infinity while the nonlinearity goes to zero, the distribution of energy over the Fourier modes (i.e. the energy spectrum) obeys a certain nonlinear kinetic equation. Despite significant efforts of mathematicians and mathematical physicists to rigorously derive this result, the problem remains unsolved.

Inspired by the Peierls' kinetic theory, during the second half of the XX-th century a parallel field, known as the wave turbulence theory, that focuses on studying weakly nonlinear wave systems, has been intensively developing. In the last decade in the problem of its rigorous justification was achieved significant progress.

In my talk I am aiming to discuss the results of the ongoing work with the setting similar to the Peierls's work, relying on the techniques that were recently developed in the works on the wave turbulence. Starting from the stochastically perturbed $d$-dimensional lattice of anharmonic oscillators, I will explain the derivation of the kinetic equation for energy spectrum of quasisolution, which is a certain approximation of the solution to the problem, and give a brief overview of the main steps and difficulties that we encountered in the process.

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[Pei29] R. Peierls, *Zur kinetischen theorie der wärmeleitung in kristallen*, Annalen der Physik **395**:8 (1929), pp. 1055–1101.