Microwave amplification in nanomechanical systems

In the recent past, an intense theoretical and experimental effort has been devoted to the analysis of the cooling of mechanical resonators by radiation pressure forces. On one hand these, studies are motivated by their interest in connection with their application as measurement devices, for instance in the detection of gravitational waves and ultra-high precision measurements. On the other, their analysis in the quantum regime allows to address fundamental questions such as quantum limits in measurement and amplification and quantum properties of mechanical objects.

In my talk I will demonstrate the possibility of using the resolved-sideband regime of an optomechanical system as a signal amplifier. I will then characterize its stability and noise properties, defining the conditions allowing to approach the quantum limit on the added noise, providing comparison between theoretical results and experimental data.