Phase cooling

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The radiation pressure is used for cooling atoms, ions and optomechanical devices. In a Fabry-Pérot interferometer in which one of the two mirrors vibrates, the Brownian motion of the vibrating mirror and hence its effective temperature can surprisingly be lowered by increasing the power of light. There is a straightforward analogy with a Josephson junction irradiated with microwave photons, where the phase difference between the wavefunctions of two superconductors, the Josephson phase, takes the role of the mirror position.
I'll show that the microwave field acts on the Josephson phase as the radiation pressure does on a vibrating mirror. Specifically, when coupled with a high quality microwave cavity, the Josephson junction generates sideband resonances for each cavity mode. Out-of-equilibrium phase heating or cooling is achieved by microwave radiation at these sidebands, corresponding to the Stokes and anti-Stokes scattering, respectively. Cooling and heating increase with microwave power.