Semiclassical perturbation theory for the quantum diffractive scattering of atoms on thermal surfaces

Shauli Daon, Eli Pollak, Salvador Miret-Artés

Weizmann Institute of Science

Inspired by the semiclassical perturbation theory of Hubbard and Miller [J. Chem. Phys.80, 5827 (1984)10.1063/1.446609], we derive explicit expressions for the angular distribution of particles scattered from thermal surfaces. At very low surface temperature, the observed experimental background scattering is proportional to the spectral density of the phonons. The angular distribution is a sum of diffraction peaks and a broad background reflecting the spectral density. The theory is applied to measured angular distributions of Ne, Ar, and Kr scattered from a Cu(111) surface..