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【117】 Increasing the dynamical range of a scanning tunneling microscope

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A method for increasing the dynamical range of scanning tunneling microscopes (STM) is introduced. We first transform the nonlinear current-voltage characteristic into a time-dependent current via AC excitation and then actively cancel dominant current harmonics using a driven compensating capacitor. The placement of the compensating capacitor allows us to create removal currents precisely opposing the currents that would otherwise saturate the preamplifier. Eliminating DC currents has no effect on the local density of states measurements, and removing the first harmonic only rigidly shifts the conductivity by a known amount.

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