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【168】 Sparse Sampling in Scanning Probe Microscopy

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The serial nature of a scanning probe microscope (SPM) renders data taking not only slow but may even prevent complex measurement tasks due to time limitations. Here we introduce the concept of compressed sensing (CS) as an effective sampling routine for SPM, requiring a significantly smaller subset of data points without compromising the measured information content. Our approach relies only on the sparsity of information in a vector domain to fulfill the requirements of CS theory. As an example we demonstrate precise reconstruction of the Cu(111) surface state wavevector from a 10-fold undersampled measurement, where the sparsity is given in Fourier space. We expect that our approach will be transformative for laboratories involved in Quantum Point Interference studies.

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