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parallel and z perpendicular to the sample s surface, scanning tunneling microscope stm type of microscope whose principle of operation is based on the quantum mechanical phenomenon known as tunneling in which the wavelike properties of electrons permit them to tunnel beyond the surface of a solid into regions of space that are forbidden to them under the rules of classical physics the probability of finding such tunnel.

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Both microscopes are based on mechanically scanning an atomically sharp tip over a sample surface with quantum mechan, scanning tunneling spectroscopy sts is a powerful experimental technique in scanning tunneling microscopy stm that uses a scanning tunneling microscope stm to probe the local density of electronic states ldos and band gap of surfaces and materials on surfaces at the atomic scale 1 generally sts involves obs, tunneling current i a t e s e ev m e f e f e ev de ? ? 2 transmission probability of the electron m e a 2 s 1 exp ? usually we assume is featureless ie and the sample electronics states domi.

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This chapter presents systematic methods to evaluate the tunneling matrix elements in the bardeen tunneling theory a key problem in applying the bardeen tunneling theory to stm is the evaluation of the tunneling matrix elements which is a surface integral of the wave

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