SEMINAR IN PHYSICS

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3:30-4:25 – Ross 0220

· Refreshments ·

Atomic Force Microscopy: Principles and Applications

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Atomic Force Microscopy, or AFM, can appear to the layperson rather intimidating. Yet, the fundamental principle of AFM is relatively simple. The operation of the machine centers upon a small, sharp tip, suspended by a cantilever, which is then deflected. This deflection measures topography and mechanical properties of a sample, and due to its unobtrusive nature is well suited for biophysical studies. Such studies are exemplified currently in cancer and collagen research.

Putting aside for a moment the explanatory science of the machine and procedure, it is best to think of AFM with an analogy. Optical microscopes are like traditional reading in that they use light to extract data; in AFM, the cantilever is like the finger, in brushing a finger along the surface to read. Optical microscopes are traditional reading; atomic force microscopes are braille reading.

Perspective on the Cosmic Microwave Background

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The Cosmic Microwave Background (CMB) is electromagnetic radiation created during the last scattering by electrons and protons shortly after the Big Bang. This gives us a glimpse of what our universe looked like when it was 380,000 years young. We use the CMB to show how our universe was created, and to further prove the modified Big Bang theory to advance our knowledge of what happened at the beginning of the inflationary period of the universe.

CMB also shows high density areas and where galaxies may have been formed, giving important information about what dark matter could be ultimately. Furthermore, it provides geometry for understanding whether our universe is flat. It may help to determine the entire content of the universe and the ratio of known matter to dark matter, as well as whether the dark is baryonic.