

Ultra Sensitive Magnetic Diagnostic using Quantum Mechanical Interference and SQUID Microscopy

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To date, the most sensitive means of detecting extremely small changes in magnetic field is through the phenomenon of superconducting quantum interference. Application of this phenomenon in the form of a dc Superconducting Quantum Interference Device (SQUID) in diagnostic equipment has been in use in industry as a fault detection technique for electronic circuit boards and chips. The diagnostic technique is one aspect of the general technique of SQUID or Scanning SQUID Microscopy which is currently being used in various fields including medicine and material analysis. In this talk, I will present a brief overview of Scanning SQUID Microscopy and the technology involved in commercial SQUID microscopes. I will end by introducing a technique to measure high frequency large bandwidth magnetic field signals which has the potential to increase SQUID microscope performance by several orders of magnitude over currently available commercial microscopes. A description of a prototype large bandwidth Scanning SQUID Microscope operating at 4K will also be presented.

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