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Magnetic Characterization of Individual Magnetotactic Bacteria LISA QIAN, Stanford University, BEENA KALISKY, Stanford University, AMANDA HAMILTON, BO DWYER, A.C. MATIN, KATHRYN MOLER, Stanford University — Magnetic nanoparticles 5-50nm in size are of wide interest in the biological and medical fields. In particular, magnetotactic bacteria containing chains of nanoscale magnetite particles show potential for MRI contrast agents and targeting tumors. Magnetic characterization is typically done in large ensembles, where variations in shape and structure cannot be determined and interparticle coupling may cause bulk properties from those of isolated particles. We report the detection and magnetic characterization of individual magnetotactic bacteria using a variable temperature scanning SQUID microscope (SSM). SSM is ideal for this challenge due to its high spin sensitivity, $\sim 100 \mu_B/\sqrt{\text{Hz}}$. AC and DC modes of operation allow for direct probing of susceptibility and magnetic moment. We will also discuss calculation techniques used to obtain values for the magnetic moment, anisotropy energy and magnetosome chain length of individual bacteria.

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