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Grain Boundary Melting in Ice ERIK THOMSON, Yale University, J.S. WETTLAUFER, Yale University, L.A. WILEN, Ohio University — The central influence that grain boundary melting has on the sintering, coarsening, transport behavior and many other bulk properties in ostensibly all materials, including ice, motivates combined experimental and theoretical studies. The great difficulty of directly accessing a grain boundary in thermodynamic equilibrium has resulted in a dearth of experimental tests. Our approach is to prepare an ice bicrystal in a thin growth cell and to probe the grain boundary directly by employing light scattering and polarization with a helium-neon laser. We first measure the direction of the c-axis of each of the grains by bringing polarized light through each domain and analyzing the polarization of the transmitted beam. We then monitor the reflected intensity as a function of temperature and concentration of monovalent electrolyte. Using scattering theory, we estimate that, if the grain boundary is dry, the reflected intensity for a high angle grain boundary will be 10^{-5} times the incident intensity. Using the index of refraction of bulk water to approximate the degree of sensitivity to the presence of a grain-boundary film, the change in reflected intensity due to a 15 $\mathring{A}$ layer of water is found to be greater than 10 %, an easily measurable signal using a 4mW laser. Results are compared with a recent theory of impurity–stimulated grain boundary melting

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