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Light scattering as a technique to probe grain boundary melting ERIK THOMSON, JOHN WETTLAUFER, Yale University, LARRY WILEN, Ohio University — Near phase equilibrium, bulk properties of polycrystalline materials are strongly influenced by an interlinked network of grain interfaces. While numerical simulations and theory have supported the idea of disorder along *grain boundaries*, direct experimental access to the interface between two crystals of any material, in thermodynamic equilibrium, has been limited. The transparency, birefringency, and melting temperature of polycrystalline ice lend it to experimental probing. By scattering the collimated light of a 2.3 mW He-Ne laser off of the boundary of a hexagonal ice bi-crystal, prepared within a controlled ice growth cell, the boundary is directly explored. Reflected light intensity is measured as a function of the thermodynamic variables: temperature and impurity concentration. C-axis orientation can be determined by a systematic analysis of extinction angles for individual crystals held between cross polarizors. Assuming the index of refraction for bulk water, for any melted layer, a change in reflected signal strength of greater than 10%, for a 1.5 nm melt layer, is expected. Results are compared with a recent theoretical study of impurity driven grain boundary melting [1], which found evidence for a wetted liquid layer separating individual grains within polycrystalline ice. [1] Benatov, L. and J.S. Wettlaufer, 2004. Abrupt grain boundary melting in ice. *Phys. Rev. E*, 70, 061606.

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