Possible Phase Transition in H$_2$O Ice Ih near 110 K$^1$ DAVID T. W. BUCKINGHAM, SUELI H. MASUNAGA, FORREST C. GILE, JOHN J. NEUMEIER, Montana State University — The thermal expansion of single-crystalline H$_2$O ice Ih was measured with $\sim 10^4$ times greater relative resolution than has previously been done. Plots of the thermal expansion coefficient, $\mu$, along the a- and c-axes reveal features which have never before been observed in thermal expansion measurements of H$_2$O ice:

- A jump in $\mu$ of magnitude $\Delta \mu \approx 10^{-5} \text{K}^{-1}$ in the temperature range 98–117 K along the c-axis, which appears to be a phase transition. No such transition is observed along the a-axis.

- Hysteresis of the transition temperature, $T_c$, of as much as 5 K for cooling rates from -5.0 to -0.1 K/min.

There is reason to believe this transition is the ferroelectric transition reported by Dengel et al.$^2$ If so, the shift in $T_c$ would result from the freezing-in of the H$_2$O molecular configurations. We will discuss our own measurements of the dielectric constant in the vicinity of $T_c$.

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