Dynamics of Small-Molecule Glass Formers Confined in Nanopores\textsuperscript{1} TIMOTHY PRISK, Indiana University Department of Physics, MADHUSUDAN TYAGI, NIST Center for Neutron Research, PAUL SOKOL, Indiana University Department of Physics — We report a comparative neutron scattering study of the molecular mobility and non-exponential relaxation of three structurally similar glass-forming liquids (isopropanol, propylene glycol, and glycerol) in bulk and confined in porous Vycor glass. Confinement reduces molecular mobility in all three liquids, and suppresses crystallization in isopropanol. High-resolution quasi-elastic neutron scattering spectra were fit to Fourier transformed Kohlrausch functions $\exp\left[-(t/\tau)^\beta\right]$, describing $\alpha$-relaxation. The stretching parameter $\beta$ is roughly constant with wavevector $Q$ and temperature. Average relaxation times $\langle \tau(Q) \rangle$ are longer at lower temperatures and in confinement. They obey a power law $\langle \tau(Q) \rangle \propto Q^{-\gamma}$, where the exponent $\gamma$ is modified by both temperature and confinement. Comparison of the bulk and confined liquids lends support to the idea that structural and/or dynamical heterogeneity underlies the non-exponential relaxation of glass-formers, as widely hypothesized in the literature.

\textsuperscript{1}This work was prepared under award 70NANB5H1163 from NIST, U.S. Department of Commerce. We acknowledge the support of NIST in providing the neutron research facilities used in this work.