Altered States of Solid Xenon\textsuperscript{1} MARK LIMES, ZAYD MA, BRIAN SAAM, University of Utah — Relaxation processes and structure in solid Xe were studied using hyperpolarization of \textsuperscript{129}Xe via spin-exchange from optically pumped Rb. In an applied field of 2T, we studied both longitudinal and transverse \textsuperscript{129}Xe relaxation; the former as a function of freezing conditions and the latter as a function of both freezing conditions and dilution of \textsuperscript{129}Xe and \textsuperscript{131}Xe atoms relative to spin-zero species. A flow-through polarizer [1] is used to freeze and collect solid Xe (both \textsuperscript{129}Xe-enriched and naturally abundant), where we adjust the partial pressure of Xe in order to alter freezing conditions, which yield reproducible differences in spin-lattice relaxation times of greater than 10\%, apparently by varying the grain size. This is surprising because the mechanism is supposed to be a bulk Raman-phonon scattering process. In a separate convection cell [2] experiment, we find that reducing the concentration of \textsuperscript{129}Xe and \textsuperscript{131}Xe narrows the NMR line shape, as expected. However, several anomalous features also arise, depending on the freezing rate. Dilute concentrations of spin-1/2 \textsuperscript{129}Xe range from 10\% to below 1\%.

\textsuperscript{1} NSF PHY 0855482

\textsuperscript{1} Schrank, et al., PRA 80, 063424 (2009).
\textsuperscript{2} Su, et al., APL 85, 2429 (2004).

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