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Spin Relaxation Phenomenon in Superfluid ^{3}He $\mathbf{A}_1$[1] H. KOJIMA, Rutgers University, S. KOBAYASHI, A. YAMAGUCHI, H. ISHIMOTO, Institute for Solid State Physics — The spin relaxation phenomenon in superfluid ^{3}He A_1 phase is studied using a newly constructed magnetic fountain pressure cell in which two reservoirs are connected via a superleak channels of height 20 μm. Experiments are carried out to explore the relaxation mechanism of the induced fountain pressure under externally applied magnetic field gradient along the superleak. The relaxation of fountain pressure reflects that of spin density. The observed relaxation time τ varies from less than 1 s near T_{c2} to about 80 s near T_{c1}. The maximum relaxation time may be limited by the normal fluid flow in the channels. Near T_{c2}, the observed relaxation rate may be described by a power law dependence on reduced temperature as $1/\tau \propto [(T - T_{c2})/(T_{c1} - T_{c2})]^{-\beta}$, where $\beta \approx 1.5$ and has little dependence on the static magnetic field(up to 8 tesla) and liquid pressure(10 - 29 bars). To our knowledge, there is no theory which predicts such increase in relaxation rate over a relatively large temperature range near T_{c2}. A preliminary interpretation is given in terms of intrinsic spin relaxation arising from small but increasing presence of minority spin pair condensate in A_1 phase as T_{c2} is approached.

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Haruo Kojima

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