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Evidence of Ferromagnetic Spin Fluctuations in the single crystalline $MgCNi_3$ superconductor DONG-JIN JANG, HYUN-SOOK LEE, HYE-GYONG LEE, SUNG-IK LEE, Department of Physics, Pohang University of Science and Technology, Pohang 790-784, Republic of Korea — Despite strong expectation of the ferromagnetic ground state or the strong ferromagnetic fluctuation in $MgCNi_3$, the real ground state shows only superconductivity without any evidence of magnetism. At least the ferromagnetic spin fluctuations should be appeared in this strong ferromagnetic Ni based compound, but no clear observation of them is absent. Lack of the single crystalline and use of the poly-crystalline $MgCNi_3$ had hindered to obtain the intrinsic signal from the spin fluctuations due to the strong scattering of the defects or grain boundaries. To clarify this issue, we prepared single crystalline $MgCNi_3$ and measured the resistivity as a function of temperature and field. Important role of the spin fluctuations as the pair breaker in the $MgCNi_3$ single crystals was confirmed in these measurements while comparing the prediction from the modified Eliashberg equation including the spin fluctuations by O. V. Dolgov *et. al.* The unusual normal-state resistivity and upward curvature of $H_{c2}(T)$ near T_c also supported the existence of the additional scattering due to the spin fluctuation scattering in addition to the typical electron-phonon scattering in BCS theory.

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