

# Hall Anomaly and Vortex Charge probed by NQR in the Superconducting State of High- $T_c$ Cuprates

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## Abstract

In high- $T_c$  superconductors (HTSC), Hall effect in the superconducting state changes the sign from the normal state. We have measured the flux flow Hall effect in the superconducting state of various HTSC from the underdoped to the overdoped regime. We show that the Hall sign is universal and is determined by the doping level; the sign is electron-like in the underdoped regime and hole-like in the overdoped regime. This tendency contradicts the prediction of the time dependent Ginzburg-Landau equation based on the  $s$ -wave weak coupling theory, suggesting that such a theory fails to evaluate the Hall force acting on the vortices in HTSC [T. Nagaoka *et al.*, Phys.Rev.Lett.**80**, 3594 (1998)].

The vortex charge arising from the difference in electron density between the core and the far outside region of the vortex has often been discussed within

the context of the Hall anomaly. Using nuclear quadruple resonance (NQR) technique, which is very sensitive to the local carrier density, we tried to detect the vortex charge. We will present a preliminary result of NQR.