Valley Susceptibility Measurements of Composite Fermions around Filling Factor $\nu = 3/2$ NATHANIEL BISHOP, MEDINI PADMANAB-HAN, KAMRAN VAKILI, YAKOV SHKOLNIKOV, ETIENNE DE POORTERE, MANSOUR SHAYEGAN, Department of Electrical Engineering, Princeton University — In the composite fermion (CF) picture, the fractional quantum Hall (FQH) states are simply the integer quantum Hall states of the particle-flux CF quasiparticles. We report magnetotransport measurements of FQH states in an AlAs quantum well around Landau level filling factor $\nu = 3/2$, demonstrating that the carriers are CFs with a valley degree of freedom. By observing valley level crossings for these FQH states as a function of applied symmetry breaking strain, we determine the CF valley susceptibility, defined as the change of CF valley polarization with strain. The results can be explained well by a simple Landau level fan diagram for CFs. The measured valley susceptibility for CFs is found to be significantly enhanced over that measured for electrons in this system,[1] and comparable to earlier measurements of the spin susceptibility in GaAs heterostructures.[2]

[1]O. Gunawan et al, Phys. Rev. Lett. 97, 186404 (2006)
[2]R. R. Du et al, Phys. Rev. Lett. 75, 3926 (1995)

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