

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Interferometric measurements to test non-Abelian properties of $e/4$ charges in the fractional quantum Hall state at $5/2$ ROBERT WILLETT, Alcatel-Lucent/Bell Labs, MICHAEL MANFRA, Purdue University, LOREN PFEIFFER, Princeton University, KIRILL SHTENGEL, University of California, Riverside, CHETAN NAYAK, University of California, Santa Barbara, and Microsoft Q — The excitations of charge $e/4$ at $5/2$ filling factor are proposed to obey non-Abelian statistics. To test this, interferometry at fractional quantum Hall states can be performed that controllably braids edge currents around localized charges. We have conducted these measurements in a large number of interferometers of different sizes, also using multiple designs of high quality 2D electron heterostructures. We observe properties of the interference measurements at $5/2$ that are specifically consistent with non-Abelian $e/4$. In particular, magnetic field sweeps around $5/2$ show interference oscillations with frequency spectra that are consistent in detail with non-Abelian $e/4$ properties. Four frequency spectra peaks are observed corresponding to both $e/4$ and $e/2$ charges; importantly a rapid non-Abelian $e/4$ component is seen that is split due to beating between the two $e/4$ braiding processes. We review these results and their observation in a range of interferometer dimensions and in different heterostructure designs.

Robert Willett
Alcatel-Lucent/Bell Labs

Date submitted: 05 Nov 2015

Electronic form version 1.4