Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Probing spin-charge relation by magnetoconductance in one-dimensional polymer nanofibers YUNG WOO PARK, Department of Physics and Astronomy, Seoul National University — Polymer nanofibers are one dimensional (1-D) organic hydrocarbon systems containing conducting polymers where the non-linear local excitations such as solitons, polarons and bipolarons formed by the electron-phonon interaction were predicted. Magnetoconductance (MC) can simultaneously probe both the spin and charge of these mobile species and identify the effects of electron-electron interactions on these nonlinear excitations. Here we report our observations of a qualitatively different MC in polyacetylene (PA) and in polyaniline (PANI) and polythiophene (PT) nanofibers. In PA the MC is essentially zero, but it is present in PANI and PT. The universal scaling behavior and the zero (finite) MC in PA (PANI and PT) nanofibers provide evidence of Coulomb interactions between spinless charged solitons (interacting polarons which carry both spin and charge).

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Date submitted: 06 Nov 2012 Electronic form version 1.4