Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

**Programming Directed Motion on the Micron Scale by Thermal Ratcheting** EMILY W. GEHRELS, W. BENJAMIN ROGERS, Harvard University, ZORANA ZERAVCIC, Rockefeller University, VINOTHAN N. MANOHARAN, Harvard University — We present an experimental system of DNA-functionalized colloidal particles which exhibit directed motion ("dancing") along patterned substrates in response to temperature cycling. We take advantage of toehold exchange in the design of the DNA sequences that mediate the colloidal interactions to produce broadened, flat, or even re-entrant binding and unbinding transitions between the particles and substrate. Using this new freedom of design, we devise systems where, by thermal ratcheting, we can externally control the direction of motion and sequence of steps of the colloidal dancer. We determine the maximum work that the system can perform by measuring a maximum average velocity as a function of the thermal ratcheting rate.

Emily W. Gehrels
Harvard University

Date submitted: 14 Nov 2014 Electronic form version 1.4