Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

The DNA mismatch repair protein MutS forms a one-dimensional Tonks gas on DNA[1] RALF BUNDSCHUH, PIOTR KLAJNER, JEUNGPHILL HANNE, BROOKE M. BRITTON, JIANQUAN LIU, Ohio State Univ - Columbus, JONGHYUN PARK, JONG-BONG LEE, Pohang University of Science and Technology (POSTECH), Republic of Korea, RICHARD FISHEL, Ohio State Univ - Columbus — MutS is a protein involved in DNA mismatch repair. It recognizes the mismatch, forms a sliding clamp around the DNA, and displaces other proteins bound to the DNA prior to the actual repair process. Here, we present a quantitative model of an ensemble of MutS molecules on a short strand of DNA with one mismatch. We model the ensemble as a Tonks gas of passively diffusing one-dimensional particles of finite extension and include clamp formation at the mismatch and random detachment. The distributions of MutS number bound to the DNA for different mismatch positions and different MutS concentrations in solution fit very well with distributions determined by single molecule experiments, thereby establishing the Tonks gas as an excellent model of MutS action on DNA.

[1]This material is based upon work supported by the National Science Foundation under Grant No. 01105458 (RB), the National Institutes of Health under Grant No. CA67007 (RF), and the National Research Foundation of Korea under Grant No. 2011-0013901 (JBL).

Ralf Bundschuh
Ohio State Univ - Columbus

Date submitted: 15 Nov 2013 Electronic form version 1.4