

Abstract Submitted  
for the PSF13 Meeting of  
The American Physical Society

**Structured mRNA induces the ribosome into a hyper-rotated state**<sup>1</sup> PETER CORNISH, PEIWU QIN, DONGMEI YU, University of Missouri, XIAOBING ZUO, Argonne National Laboratory — During protein synthesis, mRNA and tRNA are moved through the ribosome by the process of translocation. The small diameter of the mRNA entrance tunnel only permits unstructured mRNA to pass through. However, there are structured elements within mRNA that present a barrier for translocation that must be unwound. The ribosome has been shown to unwind RNA in the absence of additional factors, but the mechanism remains unclear. Here, we show using single molecule Förster resonance energy transfer and small angle X-ray scattering experiments a new global conformational state of the ribosome. In the presence of the frameshift inducing dnaX hairpin, we observed that the ribosomal subunits were driven into a hyper-rotated state and the L1 stalk was predominantly in an open conformation. This previously unobserved conformational state provides structural insight into the helicase activity of the ribosome and may have important implications for understanding the mechanism of reading frame maintenance.

<sup>1</sup>NSF CAREER award MCB-115343 and Pew Charitable Trust

Peter Cornish  
University of Missouri

Date submitted: 01 Oct 2013

Electronic form version 1.4