Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Mechanosensing by tethered membrane channels BENEDIKT SABASS, HOWARD A. STONE, Mechanical and Aerospace Engineering, Princeton University — Force-gated membrane channels are a paradigm of biological mechanosensing. These channels are often tethered to cytoskeletal elements, which allows direct transmission of the mechanical signal. How force at tethers leads to channel opening is unknown. Here, we focus on the generic role of membrane-channel interaction for gating. We propose a scaling relation, linking protein deformation under force to membrane energy. A minute conical deformation during gating leads to an elastic energy gain that far exceeds the thermal energy. Force thresholds for gating are in the experimentally inferred range and are robust against changes of membrane tension. We also study a detailed model for membrane-mediated interactions among channels. In general, interactions reduce the force threshold, leading to cooperatively enhanced gating.

Benedikt Sabass
Mechanical and Aerospace Engineering, Princeton University

Date submitted: 05 Nov 2015 Electronic form version 1.4