Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Gating mechanosensitive channels in bacteria with an atomic force microscope. RENATA GARCES, University of Goettingen, SAMANTHA MILLER, University of Aberdeen, CHRISTOPH F. SCHMIDT, University of Goettingen, THIRD INSTITUTE OF PHYSICS TEAM, SCHOOL OF MEDICAL SCIENCES COLLABORATION — The regulation of growth and integrity of bacteria is critically linked to mechanical stress. Bacteria typically maintain a high difference of osmotic pressure (turgor pressure) with respect to the environment. This pressure difference (on the order of 1 atm) is supported by the cell envelope, a composite of lipid membranes and a rigid cell wall. Turgor pressure is controlled by the ratio of osmolytes inside and outside bacteria and thus, can abruptly increase upon osmotic downshock. For structural integrity bacteria rely on the mechanical stability of the cell wall and on the action of mechanosensitive (MS) channels: membrane proteins that release solutes in response to stress in the cell envelope. We here present experimental data on MS channels gating. We activate channels by indenting living bacteria with the cantilever of an atomic force microscope (AFM). We compare responses of wild-type and mutant bacteria in which some or all MS channels have been eliminated.

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Date submitted: 06 Nov 2015 Electronic form version 1.4