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Cell-wall dynamics in growing bacteria LEON FURCHTGOTT, Stanford Department of Bioengineering, NED WINGREEN, Princeton Department of Molecular Biology, KERWYN CASEY HUANG, Stanford Department of Bioengineering — Bacterial cells come in a large variety of shapes, and cell shape plays an important role in the regulation of many biological functions. Cell shape in bacterial cells is dictated by a cell wall composed of peptidoglycan, a polymer made up of long, stiff glycan strands and flexible peptide crosslinks. Although much is understood about the structural properties of peptidoglycan, little is known about the dynamics of cell wall organization in bacterial cells. In particular, during cell growth, how does the bacterial cell wall continuously expand and reorganize while maintaining cell shape? In order to investigate this question quantitatively, we model the cell wall of the Gram-negative bacterium *Escherichia coli* using a simple elastic model, in which glycan and peptide subunits are treated as springs with different spring constants and relaxed lengths. We consider the peptidoglycan network as a single-layered network of these springs under tension due to an internal osmotic pressure. Within this model, we simulate possible hypotheses for cell growth as different combinations of addition of new springs and breakage of old springs.

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