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Package deal

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Z. Berndsen, N. Keller, S. Grimes, P. Jardine, D. Smith, *Proc. Natl Acad. Sci. USA* **111**, 8345 (2014)

Here's a packing problem for you: how do you squeeze a polymer measuring tens of micrometres into a volume spanning tens of nanometres? Ask your favourite virus. The DNA contained in many viruses undergoes a 10,000-fold volume compaction, battling against bending and repulsion with the help of a molecular motor capable of bearing some pretty hefty forces. Simple quasistatic thermodynamic models have had remarkable success in describing this process, but as Zachary Berndsen and colleagues have now shown, a full understanding pushes the problem well out of the realm of equilibrium physics.

Berndsen *et al*. used optical tweezers to investigate the dynamics of the motor responsible for packaging DNA in a type of virus that infects bacteria. When they stalled the motor and then let it resume, they found that the packaging rate increased dramatically, implying that the DNA had been kinetically constrained and that stalling had allowed it to relax — a proposal supported by timescale variability across different complexes. The effect was most pronounced when the DNA was densely packed: the authors' measured bound on relaxation time at 75% packing exceeded the time required to package the entire genome.