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Nucleation at the DNA supercoiling transition BRYAN DANIELS, JAMES SETHNA, LASSP, Cornell University — When overtwisted, DNA forms the same wound coils that are familiar from phone cords and water hoses, creating coiled structures known as plectonemes. Experiments that twist single molecules of DNA have shown that the nucleation of plectonemes is thermally activated, with hopping near the supercoiling transition between states with and without a plectoneme. Theoretical estimates of the energy barrier of $\sim 6k_BT$ naively seem incompatible with the experimental rates of ~ 1 Hz. Combining techniques from polymer physics and transition state theory, we use a dilute-gas path integral calculation to explain why the measured rate of hopping is so slow.

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