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DNA Electromotors

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The human civilization runs on rotary motors, from cars to planes, from conveyer belts to power generators, from pumps to ice cream mixers. Surprisingly, very few examples of rotary motors exist at the nanoscale. This lecture will highlight our recent efforts to develop such nanoscale electro-motors using DNA as a building material. First, I will show that a single DNA duplex can itself acts as a tiny electromotor, spinning billions of revolutions per minute when subject to external electric field. I will next describe our efforts to build more complex DNA electromotors and to realize them in practice. The lecture will highlight the applications of the all-atom molecular dynamics method to design molecular motors and to unravel microscopic phenomena that give rise to puzzling experimental observations.

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