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Quantum-Sequencing: Fast electronic single DNA molecule sequencing JOSEP CASAMADA RIBOT, ANUSHREE CHATTERJEE, PRASHANT NAGPAL, Univ of Colorado - Boulder — A major goal of third-generation sequencing technologies is to develop a fast, reliable, enzyme-free, high-throughput and cost-effective, single-molecule sequencing method. Here, we present the first demonstration of unique "electronic fingerprint" of all nucleotides (A, G, T, C), with single-molecule DNA sequencing, using Quantum-tunneling Sequencing (Q-Seq) at room temperature. We show that the electronic state of the nucleobases shift depending on the pH, with most distinct states identified at acidic pH. We also demonstrate identification of single nucleotide modifications (methylation here). Using these unique electronic fingerprints (or tunneling data), we report a partial sequence of beta lactamase (bla) gene, which encodes resistance to beta-lactam antibiotics, with over 95% success rate. These results highlight the potential of Q-Seq as a robust technique for next-generation sequencing.

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