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**DNA nucleoside interaction and identification with carbon nanotubes** SHENG MENG, Physics Department, Harvard University, PAUL MARAGAKIS, Dept. of Chem. and Chem. Bio., Harvard University, COSTAS PAPALOUKAS, Dept. of Bio. Appl. & Tech., Univ. of Ioannina, Greece, EFTHIMIOS KAXIRAS, Physics and Div. of Eng. and Appl. Sci., Harvard University — DNA and carbon nanotubes (CNTs) are prototypical one-dimensional structures. Segments of single-strand DNA are extremely flexible, strongly hydrophilic biopolymers while CNTs are extremely stiff, strongly hydrophobic nanorods. The interaction between DNA and CNTs is being intensely investigated for possible use in, e.g., DNA transporters or biosensors. Recent success in detecting DNA conformational changes and hybridization by near-infrared fluorescence of CNTs or CNT– field-effect transistors has opened the possibility of DNA sequencing through electronic means. Here we investigate the interaction of individual DNA nucleosides with a CNT in vacuum and in the presence of external gate voltage. We propose a scheme to discriminate between nucleosides on CNTs based on measurement of electronic features through a local probe such as scanning tunnelling spectroscopy. We demonstrate through quantum mechanical calculations that these measurements can achieve 100% efficiency in identifying DNA bases. Our results support the practicality of ultrafast DNA sequencing using electrical measurements.

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