Diameter-dependent conductance oscillations in carbon nanotubes upon torsion. NAGAPRIYA K.S., Weizmann Institute of Science, Rehovot, Israel, TZAHI COHEN-KARNI, LIOR SEGEV, ONIT SRUR-LAVI, SIDNEY COHEN, ERNESTO JOSELEVICH, Weizmann Institute of Science, Rehovot, Israel — Torsion-induced conductance oscillations have been recently observed in multi-wall carbon nanotubes\cite{1,2}. These oscillations have been interpreted as metal-semiconductor periodic transitions, while an alternative interpretation attributed the phenomenon to changes in registry between the walls. Here we show\cite{3} that the period of the oscillations is inversely proportional to the squared diameter of the nanotube ($\delta\phi \sim 1/d^2$). This dependence is theoretically predicted from the shifting of the corners of the first Brillouin zone of graphene across different subbands allowed in the nanotube, whereas a change in registry should give rise to a simple inverse dependence ($\delta\phi \sim 1/d$). Hence, the experimental results validate the interpretation of Fermi level shift across subbands vs. that of registry change, as a source of torsion-induced conductance oscillations in carbon nanotubes.

\cite{3} K. S. Nagapriya \textit{et al}, \textit{in preparation}.

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