

Abstract Submitted  
for the MAR06 Meeting of  
The American Physical Society

**Ballistic conductance in narrow graphene strips**<sup>1</sup> D. ARESHKIN, GWU, J.W. MINTMIRE, OSU, C.T. WHITE, NRL — With structures making them suitable for in-plane device processing, high aspect ratio graphene strips with widths down to tens of nanometers or smaller could ultimately provide important components in carbon-based quantum electronics. However, in comparison to corresponding single-wall carbon nanotubes, such strips will likely have a higher degree of imperfection due to variations in their widths and interactions with the substrate which will degrade their conductance. Also, unlike nanotubes, they can exhibit highly localized edge states which are degenerate with their more extended states at or near the Fermi level. On the other hand, their more extended states near the Fermi level have properties similar to those exhibited by related states in nanotubes, which should suppress the effects of back scattering both due to short and long-range disorder. Stimulated by these observations and recent experiments on graphene sheets, simulations were performed to assess the effects of various types of disorder on the conductance of narrow graphene strips. The results indicate that these strips can exhibit ballistic conductance over large distances in the presence of reasonable disorder making them excellent synthetic targets for carbon-based device applications.

<sup>1</sup>Supported by ONR

Carter White  
NRL

Date submitted: 01 Dec 2005

Electronic form version 1.4