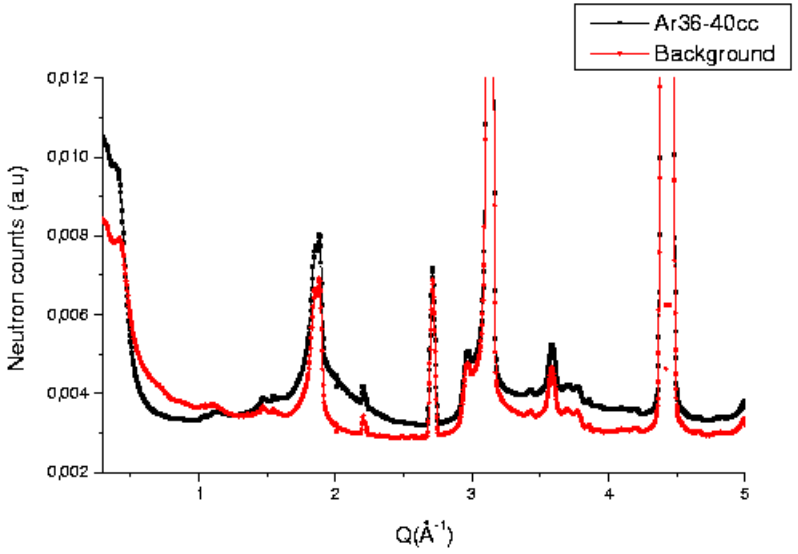
FRG: Neutron Scattering Studies of Surface and Bulk Disordered Quantum Systems

H. R. Glyde (U. Delaware), J. Larese (U. Tennessee), O. E. Vilches (U. of Washington), DMR-0115663

Neutrons can distinguish different isotopes by their scattering cross section. We have used ^{36}Ar, ^{40}Ar, deuterium and oxygen to understand where gases adsorb on carbon nanotube bundles, and whether the bundles expand or not after adsorption.



Elastic neutron scattering results from carbon nanotube bundles with and without a coating of ^{36}Ar, a very good scatterer (from Bienfait *et al.*, Phys. Rev. Letters, **91**, 035503 (July 18, 2003).

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Education:

Tate Wilson, a graduate student who will defend his PhD dissertation before March 2004, participated in neutron scattering measurements, including a trip to ILL-Grenoble to work in a diffraction experiment. The diffraction measurements have been supported extensively by graduate [Wilson, DePies (MS 2001) Ramachandran] and undergraduate students [Tyburski, BS 2002, Vandervelde, BS 2003 (Mary Gates fellow, in graduate school at Illinois), Schneble (BS 2004), Ramunno-Johnson (BS 2004, NASA Space Grant fellow)] who have done preparatory experiments at UW.

Outreach:

The UW co-PI (O. E. V) and a great teacher (Jenny Shiboyama) have an ongoing program at Canyon Park Jr. HS, where once a year he goes for a science day (one hour program repeated five times). In addition, he is a yearly participant in “Math Day”, a whole day program for Washington Middle School (largely black and hispanic students) organized by the Math Department at UW. This past March, students learned about time intervals (pulse measurements), graphing data to learn about distributions, running laps to increase the heart rate, and finally matching a pendulum period to heart rate.