

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Structure of Inert Gases Adsorbed in MCM-41¹ DYLAN EVANS, PAUL SOKOL, Indiana Univ - Bloomington — One-dimensional quantum liquids of ^3He or ^4He have generated recent interest for investigation in the Luttinger liquid model. Unfortunately, current studies lack a clear demonstration of definitively one-dimensional behavior. We propose using the templated, porous material, MCM-41, as a host for an atomic Luttinger liquid. In general, the pores of MCM-41 are too wide to provide a strictly one-dimensional environment, so we investigate preplating these pores with inert gases to effectively reduce their diameter. We present the results of studies of the structure of inert gases in MCM-41. Nitrogen sorption isotherms were used to characterize the sample. Then, using inert gases as adsorbates, we determined the minimum effective pore diameter that can be achieved in our sample before capillary condensation takes over. X-ray powder diffraction (XRD) was performed on the ideally preplated sample to investigate the structure of the adsorbates in the nanopores. The XRD measurements are compared to simulations of core-shell cylinder model scattering, and the validity of the model is assessed. The prospects for creating a definitively one-dimensional channel for the application of studying the structure and dynamics of helium confined in one dimension are discussed.

¹This work was supported by the National Science Foundation under Grant DGE-1069091.

Dylan Evans
Indiana Univ - Bloomington

Date submitted: 06 Nov 2015

Electronic form version 1.4