Elastic transmission of atoms through superfluid ^{4}**He** YAROSLAV
LUTSYSHYN, J. WOODS HALLEY, University of Minnesota — We investigate
completely elastic transmission of atoms through a slab of strongly interacting he-
lium superfluid by diffusion Monte Carlo (DMC) method. Both quasiparticle and
condensate mediated modes of transmission have been predicted[1,2] but only quasi-
particle mode has been observed[3,4]. We performed numerical calculations of the
transmission probability using DMC with a modified fixed-node approach to find
the phase shifts of scattering states for elastic transmission process of atoms inci-
dent normal to the surface of a free standing helium slab. Transmission coefficients
for different energies of the incident atom were computed. Preliminary results for the
group velocity of a transmitted wave packet hint at rapid transmission with times
characteristic of the virtual condensate mediated process. This work was supported
in part by the University of Minnesota Supercomputing Institute.

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Yaroslav Lutsyshyn
University of Minnesota

Date submitted: 23 Nov 2007   Electronic form version 1.4