

SES13-2013-000072

Abstract for an Invited Paper
for the SES13 Meeting of
the American Physical Society

Neutron scattering and the van Hove function¹

TAKESHI EGAMI, Univ of Tennessee, Knoxville

The basis for inelastic neutron scattering was laid by van Hove in his seminal paper in 1954. In this paper he showed that the dynamic structure factor we observe by inelastic scattering, $S(Q, E)$, is related through the double Fourier-transform to the correlation function in space and time, $g(r, t)$, the so-called van Hove function. This paper allowed us to interpret theoretically the results of inelastic scattering, and is widely known for this reason. However, the van Hove function itself has almost never been used. This is because in order to obtain it through the Fourier-transformation $S(Q, E)$ has to be determined over a wide range of Q and E , which is difficult with the conventional triple-axis spectrometer, and also there has been no need to obtain the van Hove function. This is now changed because the chopper spectrometers used with the spallation source can determine $S(Q, E)$ over a wide range of Q and E . We discuss how the van Hove function helps understanding the atomic dynamics of a liquid, and how this explains the viscosity of a liquid.

¹This work was supported by the U.S. Department of Energy, Office of Basic Energy Sciences, Materials Science and Engineering Division.