Real-space and time visualization of excitations of the fractional quantum Hall edge (online talk)

Go Yusa*[1]

[1]Tohoku University – Japan

Abstract

We present scanning optical stroboscopic confocal microscopy and spectroscopy measurements wherein three
degrees of freedom, namely, energy, real space, and real time, are resolvable. The edge-state propagation is
detected as a temporal change (on the order of sub-ps) in photoluminescence spectra in the downstream edge. We succeeded in visualizing the excited states of the most fundamental fractional quantum Hall state and the collective excitations near the edge. Furthermore, by using pump-probe technique, we demonstrate the temporal resolution of such stroboscopic pump-probe measurements reaches as fast as the duration time of the probe pulse (_˜1 ps). The results verify the current understanding of the edge excitation, i.e., edge magnetoplasmon or charge density wave, and enable us to distinguish between other high-energy non-linear excitations and the edge. This method may be used to derive the metric tensor of the (1+1) = 2-dimensional spacetime in analogue quantum universe and black holes implemented in quantum Hall edge.

*Speaker