Detection of zero-modes induced by defect in the Kitaev quantum wire model SHENG-WEN LI, ZENG-ZHAO LI, CHANG-PU SUN, Beijing CSRC — The Kitaev quantum wire model has two Majorana edge states for open boundary condition. The existence of a defect on a homogenous quantum wire would effectively cut off the wire at this position and generate new boundaries. In this case, another pair of low-energy modes would emerge, localized on both sides of this site, whose energies also approach zero for strong defect. We build up an exactly solvable quantum Langevin equation to describe the electrical current of the quantum wire contacted with two normal leads. If the lead is put besides different sites of the quantum wire, we obtain different transportation profile. When the lead is contacted with the site beside the defect, we would observe a splitting in the differential conductance spectrum, which is determined by the defect strength.

Xiao-Jie Liu
Beijing CSRC