Probing non-Abelian anyons in the quantum Hall interferometry

Xin Wan

*Asia-Pacific Center for Theoretical Physics, Pohang, Korea*

and

*Department of Physics, Zhejiang University, Hangzhou, China*

The fractional quantum Hall state at Landau level filling fraction 5/2 has attracted considerable attention recently due to its possible non-Abelian quasiparticle excitations, which can be used to implement fault-tolerant quantum computation. The exotic ground state is widely believed to be the Moore-Read state (or its particle-hole conjugate), a reincarnation of a chiral $p$-wave superconductor with charge-e/4 non-Abelian quasiparticle excitations being neutral Majorana fermions dressed by charged chiral bosons. Such a non-Abelian quasiparticle, in particular its non-Abelian statistics, can be probed by an odd-even effect in a double point contact interferometer. However, the system also supports Abelian charge-e/2 quasiparticles, which are also relevant to inter-edge tunneling. I will discuss the contrasting behavior of the two kinds of quasiparticles in inter-edge tunneling and in thermal smearing, which leads to nontrivial signatures in quasiparticle interferometry observed in a very recent experiment (Willett *et al.*, PNAS, 2009). In particular, the alternating e/4 and e/2 oscillation at low temperatures is speculated to be related to the existence of non-Abelian quasiparticles. The competing interpretation based on the Coulomb blockade effect will be discussed.