VORTEX DYNAMICS IN FINITE SUPRECONDUCTING NETWORKS AND COMPOSITE STRUCTURES OF D- AND S-WAVE SUPERCONDUCTORS (D-DOT)

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We investigated the vortex dynamics in several nano-sized superconductors.

In finite superconducting networks, we found peculiar vortices, such as giant vortex and anti vortex [1,2]. And, we investigated the dynamics of vortices in the asymmetric finite networks under the external AC current using the time-dependent Ginzburg-Landau (GL) equation. And found the rectified motion of vortices, which depends on the external magnetic field, temperature and the amplitude of the AC current [3].

In a composite structure of d- and s-wave superconductors (d-dot), we showed the appearance of the spontaneous half-quantum magnetic flux, using the two-components GL equation. We proposed a cellar automata-like logic gate using these half-quantum vortices, and simulated the operation of this gate [4].

References

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