Diffusion of Vortices to 'Extra-Dimension' in Tachyon Condensation via Domain Wall Annihilation in Segregated Bose-Einstein Condensates

H. Takeuchi[a], K. Kasamatsu[b], M. Tsubota[c], and M. Nitta[d]

[a]Department of Physics, Osaka City University, Japan
[b]Department of Physics, Kinki University, Japan
[c]Department of Physics and The Osaka City University Advanced Research Institute for Natural Science and Technology (OCARINA), Osaka City University, Japan
[d]Department of Physics and Research and Education Center for Natural Sciences, Keio University, Japan

In our previous work[1], it is proposed that a domain-wall annihilation in two-component Bose-Einstein condensates causes tachyon condensation accompanied by spontaneous symmetry breaking in a two-dimensional subspace. Here, three-dimensional vortex formation from domain-wall annihilations is considered kink formation in the two-dimensional subspace along the walls. In this sense, the dimension perpendicular to the subspace may be called an 'extra-dimension'. In this work, we investigate how the diffusion of vortices to the 'extra-dimension' influences the relaxation dynamics of the tachyon condensation.

1. Takeuchi, H., Kasamatsu, K., Tsubota, M., and Nitta, M. (2012) "Tachyon Condensation Due to Domain-Wall Annihilation in Bose-Einstein Condensates", Phys. Rev. Lett. **109**, 245301.

Section: QG - Quantum gases

Keywords: Bose-Einstein condensates, Domain wall annihilation, Tachyon condensation