

# Aharonov-Anandan Phase in Non-unitary Cyclic Dynamics

Qing-hai Wang

*Department of Physics, National University of Singapore*

qhwang@nus.edu.sg

Non-Hermitian systems describe a wide class of systems in the classical domain and can be also regarded as extensions of conventional quantum systems. Their spectral and dynamical features have attracted considerable interests. In this talk, I will expose rich physics in non-unitary cyclic time evolution of non-Hermitian systems, using Aharonov-Anandan (AA) phase as a quantitative diagnostic tool. I will first clear much confusion in the literature by showing that the AA phase is always real, and a previous expression for AA phase, once slightly modified, can equally apply to non-Hermitian systems. I will then analyze AA phase in two periodically driven non-Hermitian models. In the slow-driving limit, the AA phase reduces to the Berry phase in the first case, but oscillates violently and does not approach any limit in the second case. The rich geometrical features of non-unitary dynamics are thus seen to be a largely unexplored but fruitful topic for future theoretical and experimental studies.