Heavy quark master equations in the Lindblad form

YUKINAO AKAMATSU, KMI, Nagoya University — Understanding the quantum dynamics of quarkonia is essential in the description of bottomonia and charmonia in the quark-gluon plasma. So far, it has been quite naively assumed that their dynamics can be described by the Schrödinger equation with in-medium, screened potential. Such a naïve approach is incomplete, especially when one studies the time-evolution of quarkonia. After the discovery of imaginary part in the real-time in-medium potential, it is recognized that quarkonia should be viewed as open quantum systems in the environment of quark-gluon plasma. In the open quantum system, master equation, instead of the Schrödinger equation, describes the quantum dynamics of quarkonia. Open quantum system techniques, such as influence functional approach, have been applied to quarkonia. In this presentation, I will summarize developments in this approach and show how to obtain the Lindblad-form master equation, which preserves the complete positivity of the density matrix of the system.