Abstract. Continuous-time measurements are instrumental for a multitude of tasks in quantum engineering and quantum control, including the estimation of dynamical parameters of open quantum systems monitored through the environment. However, such measurements do not extract the maximum amount of information available in the output state, so finding alternative optimal measurement strategies is a major open problem.

In this paper we solve this problem in the setting of discrete-time input-output quantum Markov chains. We present an efficient algorithm for optimal estimation of one-dimensional dynamical parameters which consists of an iterative procedure for updating a `measurement filter' operator and determining successive measurement bases for the output units. A key ingredient of the scheme is the use of a coherent quantum absorber as a way to post-process the output after the interaction with the system. This is designed adaptively such that the joint system and absorber stationary state is pure at a reference parameter value. The scheme offers an exciting prospect for optimal continuous-time adaptive measurements, but more work is needed to find realistic practical implementations.