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Antoine Tilloy: Non-Markovian linear quantum feedback of continuous measurements

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Continuous measurement schemes have an interest beyond the simple unraveling of an open system evolution as they allow for control. Indeed, a certain function of the past measurement signal can be fed back into the system through an external drive to provide e.g. a controllable dissipation source, stabilize a state or purify it faster. However, very few situations yield a manageable master equation (after averaging) once the control scheme is taken into account. One such example is the so called Markovian feedback setup in which an external potential proportional to the instantaneous signal is applied on the state. Beyond that, if the signal is convoluted with a linear filter (e.g. to include some integration window, a delay, or a low pass component), it seems that nothing is known. I will show that the general case of a non-Markovian linear feedback can be solved formally to yield a master equation identical to that of a system coupled to a specific non-Markovian bosonic bath. From this structural correspondence, it will be clear that can import the standard techniques known in open-system theory (projection operator techniques, time convolutionless master equations, Dyson expansions…) to obtain numerical results from the analytical but formal solution.