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Non-reciprocal quantum interactions and devices via autonomous feed-forward A. METELMANN, Princeton University, A.A. CLERK, McGill University — In a recent work [A. Metelmann and A. A. Clerk, Phys. Rev. X **5**, 021025 (2015)], a general reservoir-engineering approach for generating non-reciprocal quantum interactions and devices was described. We present how in many cases this general recipe can be viewed as an example of autonomous feed-forward: the full dissipative evolution is identical to the unconditional evolution in a setup where an observer performs an ideal quantum measurement of one system, and then uses the results to drive a second system. We also extend the application of this approach to non-reciprocal quantum amplifiers, showing the added functionality possible when using two engineered reservoirs. In particular, we demonstrate how to construct an ideal phase-preserving cavity-based amplifier which is full non-reciprocal, quantum-limited and free of any fundamental gain-bandwidth constraint.

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