# How to administer an antidote to Schrödinger's cat

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In his most famous Gedankenexperiment, Erwin Schrödinger imagined a box with a cat and a poisonous substance that is released based on the 50% probable decay of a radioactive atom. The survival of the cat and the state of the poison become entangled, and the fate of the cat is determined upon opening the box. We present an experimental technique that keeps the cat alive on any account.

Our approach relies on the time-resolved Hong–Ou–Mandel effect: two long, identical photons emitted from an atom strongly coupled to an optical cavity impinge on a beam splitter. They always bunch in either of the outputs, even if they are not detected simultaneously, and they even allow for the implementation of all-optical quantum gates [1].

Interpreting the first photon detection as the state of the poison, the second photon is identified as the state of the cat. Once the first photon's state has been determined, the second normally follows suite. However, we here demonstrate that a sudden phase change between the inputs, administered conditionally on the outcome of the first detection, allows us to steer the second photon to a pre-defined output and thus ensures that the cat is always observed alive [2].

[1] A. Holleczek, O. Barter, A. Rubenok, J. Dilley, P. B. R. Nisbet-Jones, G. Langfahl-Klabes, G. D. Marshall, C. Sparrow, J. L. O'Brien, K. Poulios, A. Kuhn, and J. C. F. Matthews: Quantum logic with cavity photons from single atoms. Phys. Rev. Lett. 117, 023602 (2016)

*[2] J. R. Alvarez, M. IJspeert, O. Barter, B. Yuen, T. D. Barrett, D. Stuart, J. Dilley, A. Holleczek, and A. Kuhn:* How to administer an antidote to Schrödinger's cat*,* J. Phys. B: At. Mol. Opt. Phys. ***55,*** *054001 (2022)*