

# Interference of two photons of different color

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We consider the interference of two photons with different colors in the context of a Hong-Ou-Mandel experiment, in which single photons enter each of the input ports of a beam splitter, and exit in the same, albeit undetermined, output port. Such interference is possible if one uses an active (energy-non-conserving) beam splitter. We find scenarios in which one "red" and one "blue" photon enter the beam splitter, and either two red or two blue photons exit, but never one of each color. We show how the precise form of the active beam-splitter transformation determines in what way the spectral degrees of freedom of the input photons should be related to each other for perfect destructive interference of the different-color components in the output. We discuss two examples of active beam splitters: one is a gedanken experiment involving a moving mirror and the other is a more realistic example involving four-wave mixing in an optical fiber.

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