NANOPHOTONICS

Photon transfer on demand

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Strongly confined photons give access to enhanced light–matter interactions. Marking a further step in the manipulation of trapped light quanta, Ryotaro Konoike and colleagues now demonstrate on-demand photon transfer between two photonic crystal nanocavities at arbitrary positions on a chip. The three nanocavities were separated by 41 μm from each other and connected by waveguides. Initially, cavities A and B were detuned from each other, and the resonant frequency ω_C of nanocavity C was set to be lower than those of the neighbouring cavities: in these conditions, all externally injected photons could be trapped in cavity A. By increasing ω_C adiabatically, the team observed the transfer of photons from cavity A to cavity B. To ensure the required variation of ω_C, nanocavity C was illuminated by 71-ps-long control pulses. Interfering photons dropped from cavity A or B with a pulsed reference beam demonstrated successful photon transfer for three different timings of the control pulses, highlighting the temporal control over this process. The intrinsic lifetime of the trapped photons in the system was about 200 ps, and the maximum transfer efficiency was 90%. *GD*