

The ability to prepare, optically read out and coherently control single quantum states is a key requirement for quantum information processing. Optically active solid-state emitters have emerged as promising candidates with their prospects for on-chip integration as quantum nodes and sources of coherent photons connecting these nodes. Under a strongly driving resonant laser field, such quantum emitters can exhibit quantum behaviour such as Autler–Townes splitting and the Mollow triplet spectrum. Here we demonstrate coherent control of a strongly driven optical transition in silicon vacancy centre in diamond. Rapid optical detection of photons enabled the observation of time-resolved coherent Rabi oscillations and the Mollow triplet spectrum. Detection with a probing transition further confirmed Autler–Townes splitting generated by a strong laser field. The coherence time of the emitted photons is comparable to its lifetime and robust under a very strong driving field, which is promising for the generation of indistinguishable photons.