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Correlated two-photon generation by diamond atomic system in Yb atoms TAI HYUN YOON, MINSOO SONG, Korea University, Seoul, Korea — We study a non-degenerate correlated two-photon generation with narrow bandwidths of 50 MHz by using a diamond atomic system in the collimated Yb atomic beam. We excited the 6s2 1S0 atoms into the 6s7s 1S0 excited state by the resonant two-photon transition via the intermediate 6s6p 1P1 state. Then, the excited atoms decay spontaneously into the 6s2 1S0 ground state via the inter-combination 6s6p 3P1 state. We are focusing on the closed-loop two-photon absorption/excitation path through which correlated two photons having the wavelengths of 611.3 nm (Stokes) and 556.8 nm (anti-Stokes) can be generated efficiently. We performed first a two-photon absorption spectroscopy for the 1S0-1P1-1S0 two-photon transitions. An ECDL at 399 nm was used to excite the 1S0-1P1 transition and another ECDL at 1077 nm was used to excite the 1P1-1S0 transition. From the spontaneous two-photon emission process, we were able to detect correlated two-photons at 611.3 nm and 555.8 nm at the plane perpendicular to the excitation beams, and parallel to the Yb atomic beam. We detected a few times of 106 photons per second both at the idler and signal beams at the condition of two-photon resonance with the detection solid angle of only 0.01 sr. We also performed an optical switching and modulation experiments of the photon-pair by optically switching and frequency modulation of the 399-nm driving field.

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