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Exciton absorption of entangled photons in semiconductor quantum wells[1] FERNEY RODRIGUEZ, DAVID GUZMAN, LUIS SALAZAR, LUIS QUIROGA, Universidad de los Andes, CONDENSED MATTER PHYSICS GROUP TEAM — The dependence of the excitonic two-photon absorption on the quantum correlations (entanglement) of exciting biphotons by a semiconductor quantum well is studied. We show that entangled photon absorption can display very unusual features depending on space-time-polarization biphoton parameters and absorber density of states for both bound exciton states as well as for unbound electron-hole pairs. We report on the connection between biphoton entanglement, as quantified by the Schmidt number, and absorption by a semiconductor quantum well. Comparison between frequency-anti-correlated, unentangled and frequency-correlated biphoton absorption is addressed. We found that exciton oscillator strengths are highly increased when photons arrive almost simultaneously in an entangled state. Two-photon-absorption becomes a highly sensitive probe of photon quantum correlations when narrow semiconductor quantum wells are used as two-photon absorbers.

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