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Resonant Scattering of Surface-Plasmon-Polariton Waves by a Dynamical Quantum Dot[1] DANHONG HUANG, MICHELLE EASTER, US Air Force Research Laboratory, GODFREY GUMBS, Hunter College, SHAWN-YU LIN, RPI, XIANG ZHANG, UC Berkeley, ALEXEI MARADUDIN, UC Irvine — The resonant scattering of a launched surface-plasmon-polariton wave by an embedded quantum dot above the dielectric/metal interface is explored in the strong-coupling regime. In contrast to non-resonant scattering by a localized dielectric surface defect, a strong resonant peak in the scattering-field spectrum is predicted and accompanied by the presence of two side valleys. The peak strength depends nonlinearly on the amplitude of surface-plasmon-polariton wave, reflecting the feedback dynamics from photoexcited electron-hole pairs inside the quantum dot. This unique behavior in the scattering-field peak strength is correlated with a resonant dip in the absorption spectrum of surface-plasmon-polariton wave due to interband photon-dressing effect.

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