

Does a Surface Polariton Have Spin?

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We consider a σ -polarized surface electromagnetic wave (surface polariton) at the interface between the vacuum and a metal or left-handed medium. We show that the evanescent electromagnetic waves forming the surface polariton inevitably possess a backward spin energy flow, which, together with a superluminal orbital energy flow, form the total Poynting vector. This spin energy flow generates a well-defined (but not quantized) spin angular momentum of surface polaritons which is orthogonal to the propagation direction. The spin of evanescent waves arises from the imaginary longitudinal component of the electric field which makes the polarization effectively elliptical in the propagation plane. We also examine the connection between the spin and chirality of evanescent modes.