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Plasmonic resonance scattering from a silver nanowire illuminated by a tightly focused singular beam

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Scattering features of tightly focused singular beams are investigated by placing a cylindrical nanowire in the vicinity of a line phase singularity. Applying illumination wavelength corresponding to silver cylinder plasmonic resonance, we compare the scattering response with that of a perfect conductor. The rigorous modeling employs a 2D versions of the Richards-Wolf focusing method and the source model technique. It is found that a cylinder with a plasmonic resonance produces a strong scattering response by deflecting the power flow towards the optical singularity region, where otherwise the power approaches zero.

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Objects that are significantly smaller than the wavelength are known to produce a strong scattering response when illuminated at wavelengths corresponding to their plasmonic resonance [1, 2]. The scattering properties of silver nanowires, which are considered in this work, have been thoroughly investigated as a function of their cross-sectional shape under plane wave illumination (see, for example, [3] and references therein). In this Letter, we are concerned with