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

Alexander Normatov,* Boris Spektor, Yehuda Leviatan and Joseph Shamir

Department of Electrical Engineering, Technion – Israel Institute of Technology, Technion City,
Haifa 32000, Israel

*Corresponding author: alexn@tx.technion.ac.il

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.

OCIS codes: 290.5850, 240.6680, 050.4865.

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