Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Spectral response of the optical second-harmonic scattering from a metallic cylinder JESUS MAYTORENA, CLAUDIO VALENCIA, CCMC-UNAM, Ensenada B.C., Mexico — We study the scattering of second-harmonic (SH) radiation generated by an infinite cylinder of homogeneous, isotropic, centrosymmetric material and arbitrary radius illuminated perpendicularly to its axis with $p-$ or $s-$ polarized light. We derive analytical expressions for the SH radiated field and illustrate the theory for a simple metal cylinder. The nonlinear source polarization includes both a nonlocal bulk term and a dipole-allowed surface term which corresponds to the interfacial region where the inversion symmetry is broken. We consider the cylinder as locally flat and use the dipolar surface susceptibility resulting from a microscopic calculation based on the density functional formalism for a planar jellium surface. The frequency dependence of this surface contribution manifests itself in the spectral response. The calculated SH scattering cross section shows a separated peak corresponding to a surface-intrinsic collective mode in addition to peaks due to plasmon modes of the cylinder whose frequencies are determined by the linear optical properties at either fundamental or SH frequency.

Jesus Maytorena
CCMC-UNAM, Ensenada B.C., Mexico

Date submitted: 01 Dec 2004 Electronic form version 1.4