Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Spectral Oscillations in Backscattering of Light from a Biological Cell[1] ALEXANDER HEIFETZ, Argonne National Laboratory, ALEXANDER PATASHINSKI, VADIM BACKMAN, Northwestern University — Based on general electrodynamics principles, we provide an explanation for spectral oscillations in the intensity of visible light elastic backscattering from a live epithelial biological cell. We suggest that the source of spectral oscillations in backscattering from a cell is the nucleus, which is a spheroidal particle several times larger then the incident wavelength, and has a sharp boundary. Because of the small optical contrast of the nucleus relative to surrounding cytoplasm, contribution of single scattering to the overall signal is comparable to that of multiple scattering. We show that the high frequency spectral oscillations in backscattering are due to single scattering, which can be obtained in the first Born approximation. Multiple scattering effects result in slow envelope spectral oscillations. We expand the Mie backscattering cross-section of a uniform sphere in power series to show that the equivalence between the first order Mie backscattering and first order in Born series.

[1]American Cancer Society & Canary Foundation.

Alexander Heifetz

Date submitted: 04 Feb 2009 Electronic form version 1.4