Abstract Submitted
for the 4CF09 Meeting of
The American Physical Society

Resolution Enhancement Through Focal Field Polarization Control in Third Harmonic Generation Microscopy OMID MASIHZADEH, PHILIP SCHLUP, RANDY BARTELS, Colorado State University — In optical microscopy, the polarization state of the focal field strongly influences formed images due to its impact on effective focal spot size, and interactions with the sample. We demonstrate control over focal field spatial polarization state improves spatial resolution in laser-scanning third harmonic generation (THG) microscopy. The focal field is manipulated by imaging a spatial light modulator to the focal plane of a moderate numerical aperture microscope. The resolution enhancement arises as THG is quenched for circularly-polarized fundamental field in isotropic media. A transverse spatial resolution of up to 2 times is demonstrated. Moreover, a non-iterative algorithms is developed for characterization of the polarization state at the focus under moderate focusing. In this regime, the recorded THG signal is dominated by the incident paraxial polarization component, the spatial polarization state is determined non-iteratively via three linear-polarization projection THG images. A nano-particle, localizes THG scattering to a small focal volume. Scanning this nano-probe through the focal volume allows for complete reconstruction of the vector point spread function, yielding transverse field components from the focal volume.

Omid Masihzadeh
Colorado State University

Date submitted: 29 Sep 2009 Electronic form version 1.4