

Department of Physics & Astronomy

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Friday, November 30, 2012

3:15 p.m. - 4:15 p.m.

BB 3.04.18*

Microspherical Photonics: Optical Super-Resolution, Resonant Light Pressure, and Periodical Focusing Effects

Mesoscale dielectric spheres have fascinating near field optical properties including photonic nanojets and optical super-resolution effects. Use of such spheres in many optical instruments could open the way to better microscopes capable of viewing viruses, and open new ways of assembling photonic integrated

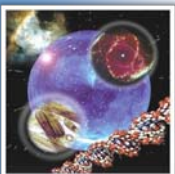
circuits. We show that high-index liquid-immersed spheres can be used for nanostructure imaging with the minimal discernible feature sizes well beyond classical diffraction limit [1]. We present the results of optical propelling experiments demonstrating important role which whispering gallery modes play in resonant enhancement of the optical forces exerted on microspheres in evanescent field couplers [2]. Finally, we present the optical transport and periodical focusing properties of chains of spheres which can be used for developing filters of radial polarization, waveguides [3] and laser scalpels [4].

[1] A. Darafheh, G. Welsh, L. Dal Negro, and V.N. Astratov, APL101, 141128 (2012).

[2] Y. Li, O. Svitelskiy, D. Carnegie, E. Rafailov, and V.N. Astratov, submitted to Light: Science & Applications (2012).

[3] A. Darafshesh and V.N. Astratov, APL 100, 161121 (2012).

[4] T.C. Hutchens, A. Darafsheh, A. Fardad, A.N. Antoszyk, H.S. Ying, V.N. Astratov,

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