

Vision & Focus

Economic

To transition semiconductor technologies to another Moore's law hierarchy of application and growth...

Scientific

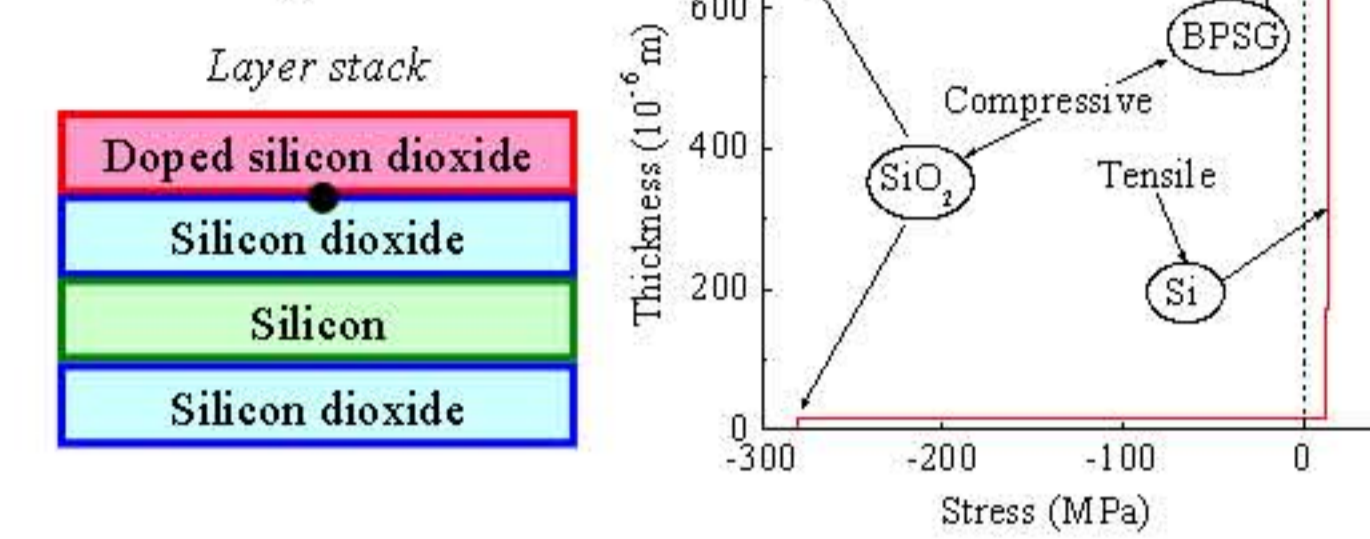
To blur operational independence between electron and photon across extended systems → *interlaced electronic and photonic local densities of state*...

Technological

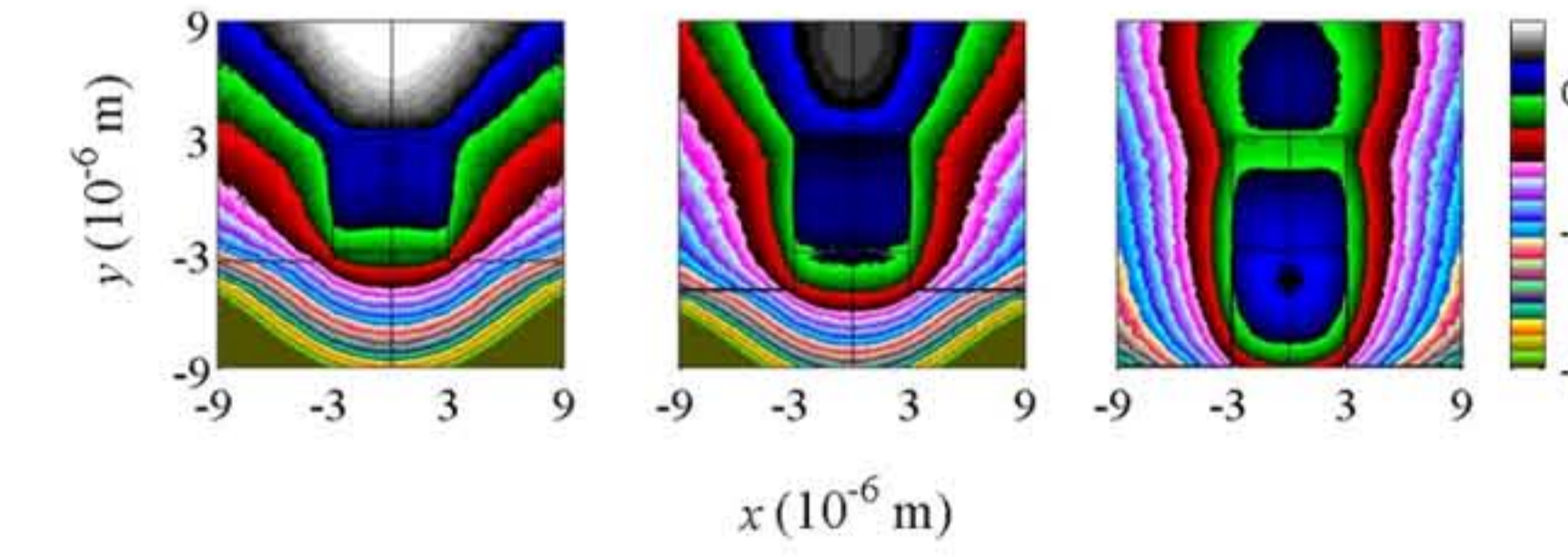
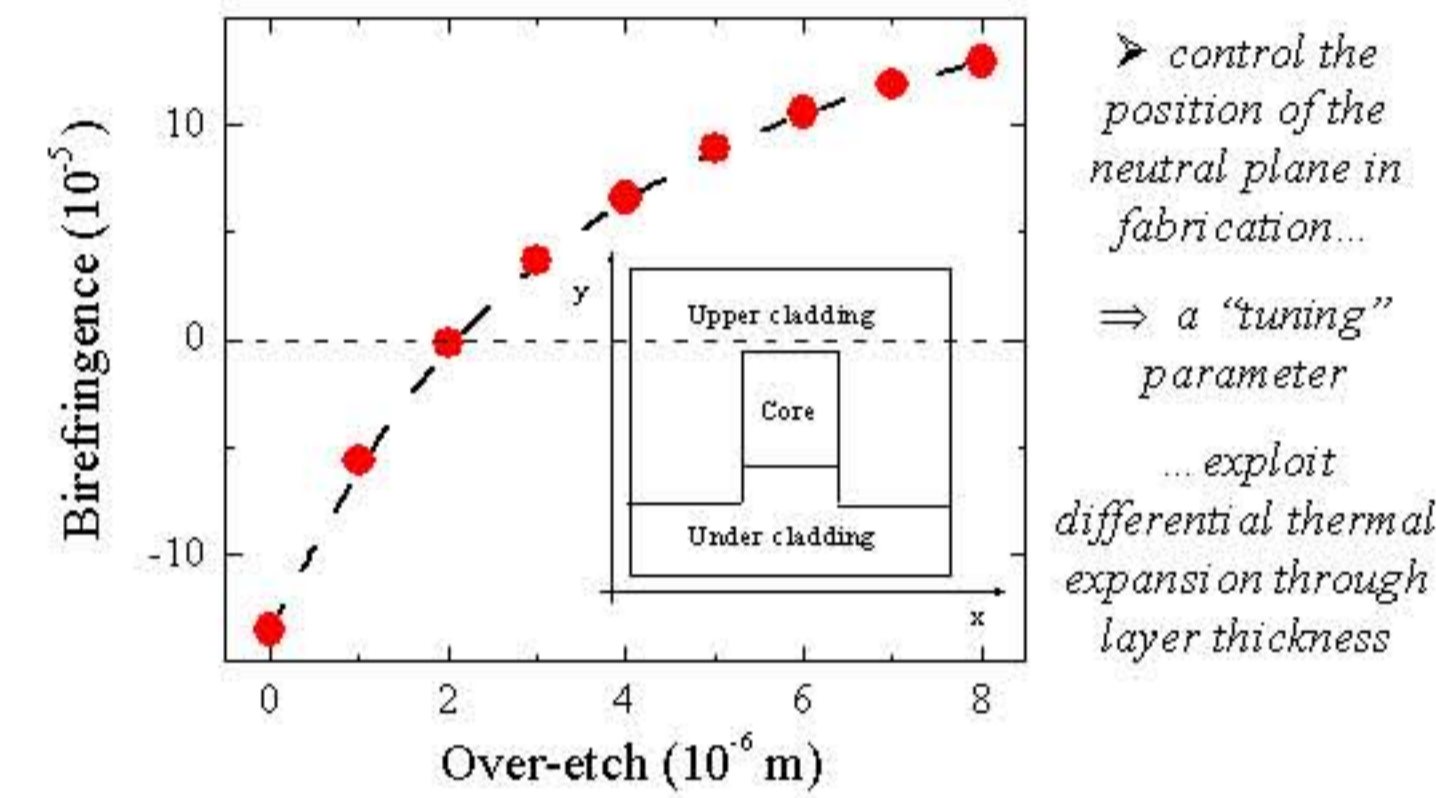
To develop manufacturing processes, design capability and test instrumentation for heterogeneous and monolithic integration of photonic nanosystems...

Doped-Silica Waveguiding

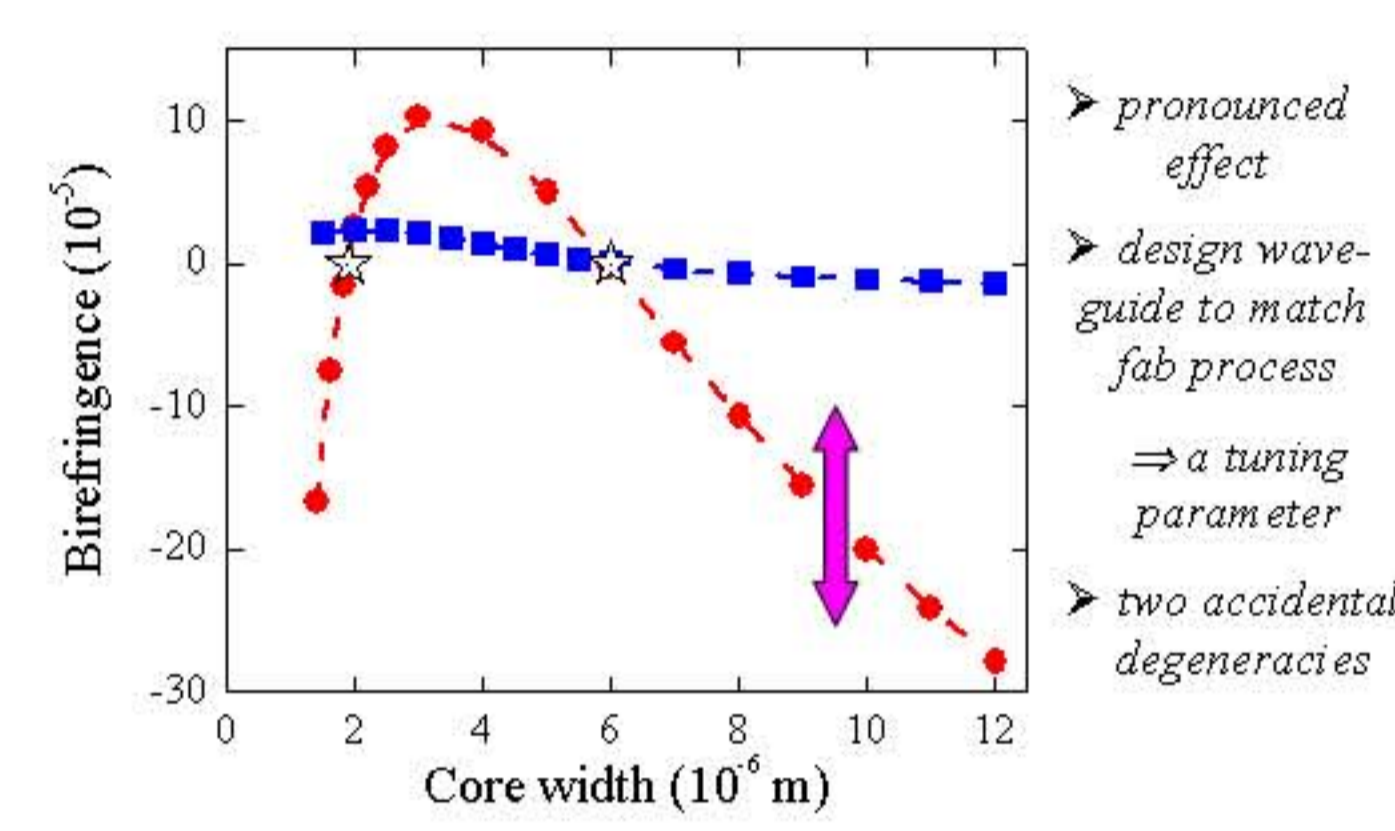
Multilayer stresses



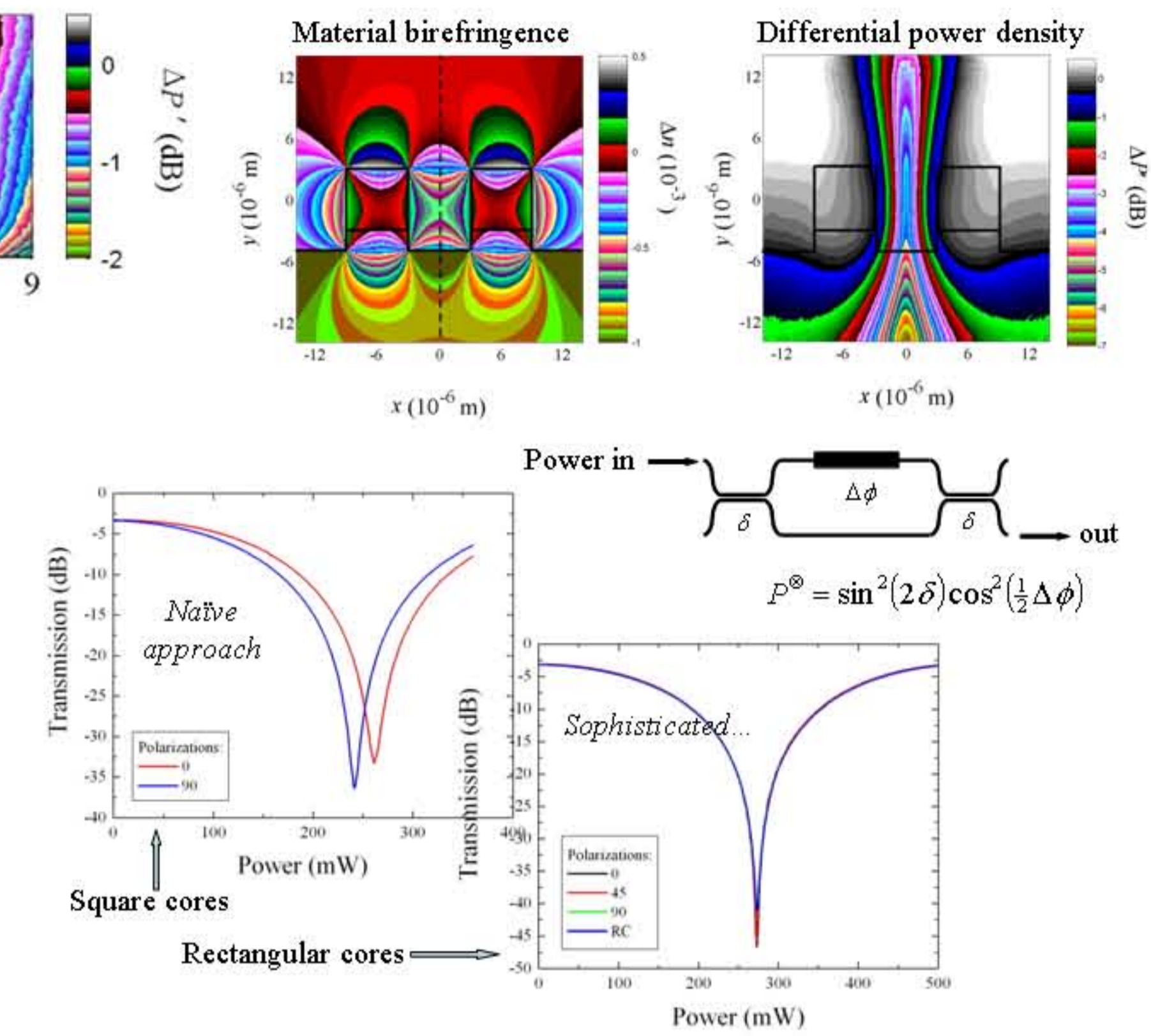
Isolated square-core waveguide



Rectangular core – effect of stress on form birefringence

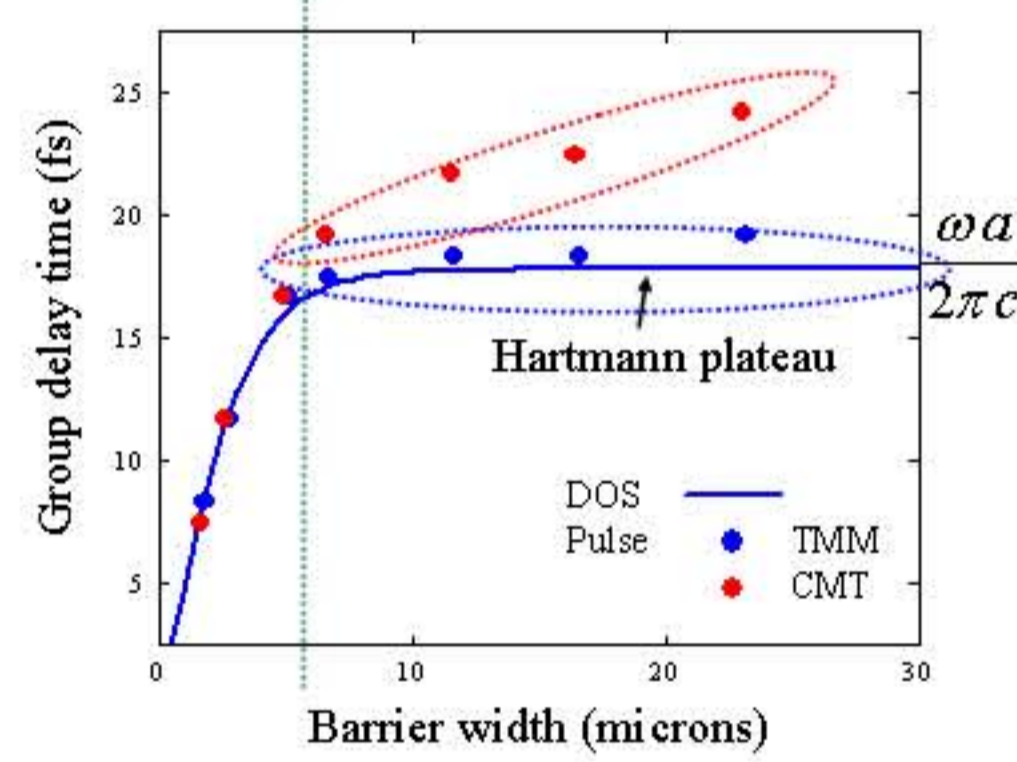


Component Integration...

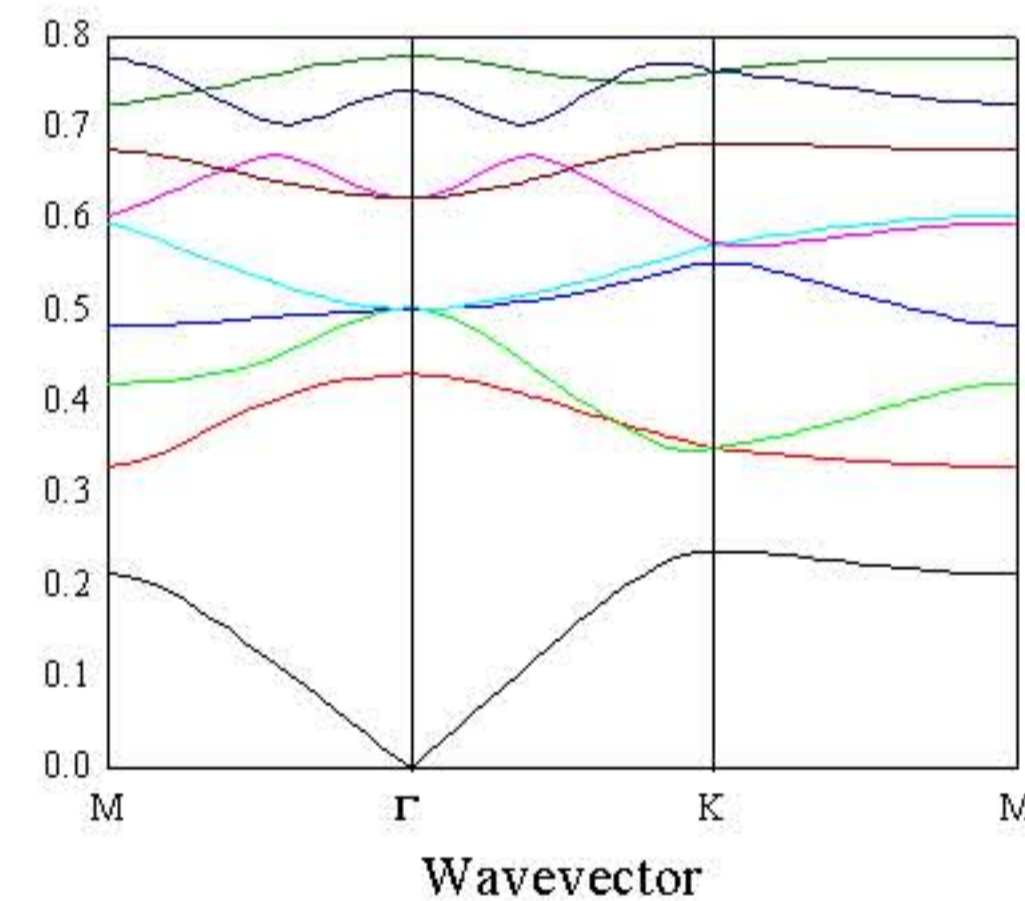


Photon Transport in Periodic Metasystems

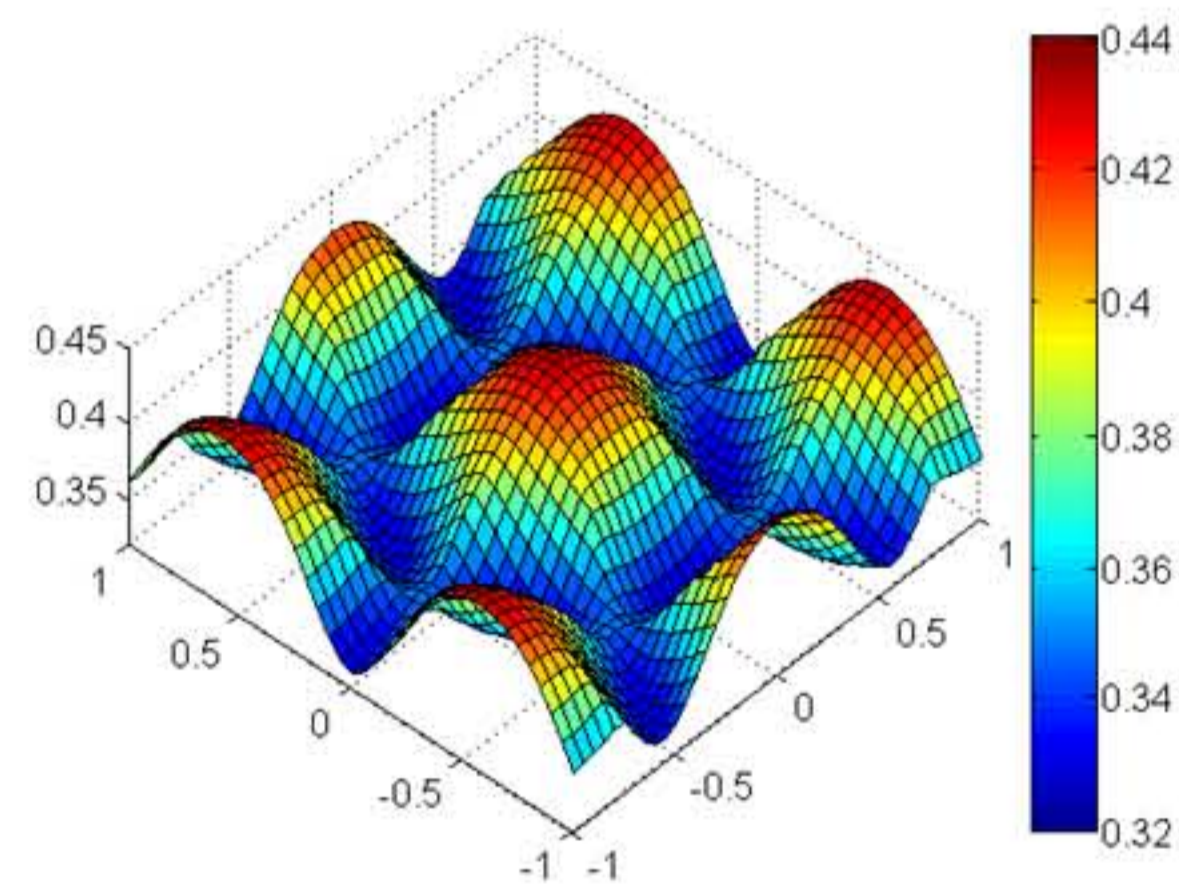
Barrier Tunneling



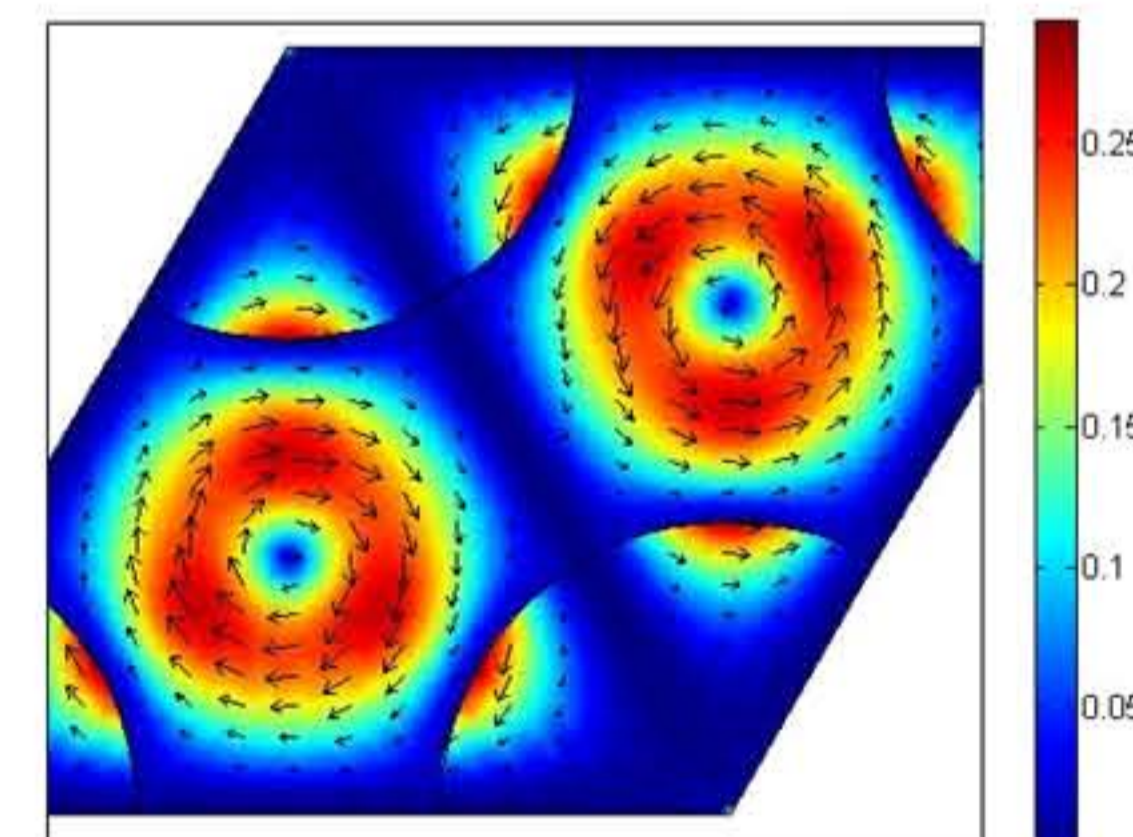
Photonic Band Structure (TE)



Dispersion Surface, Band 2

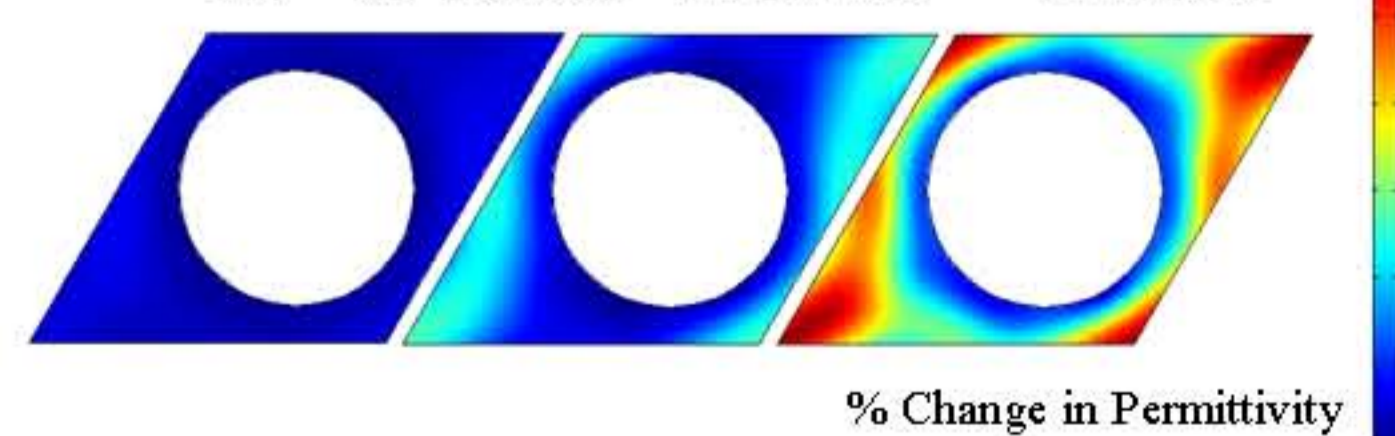


Multiple Bragg Scattering



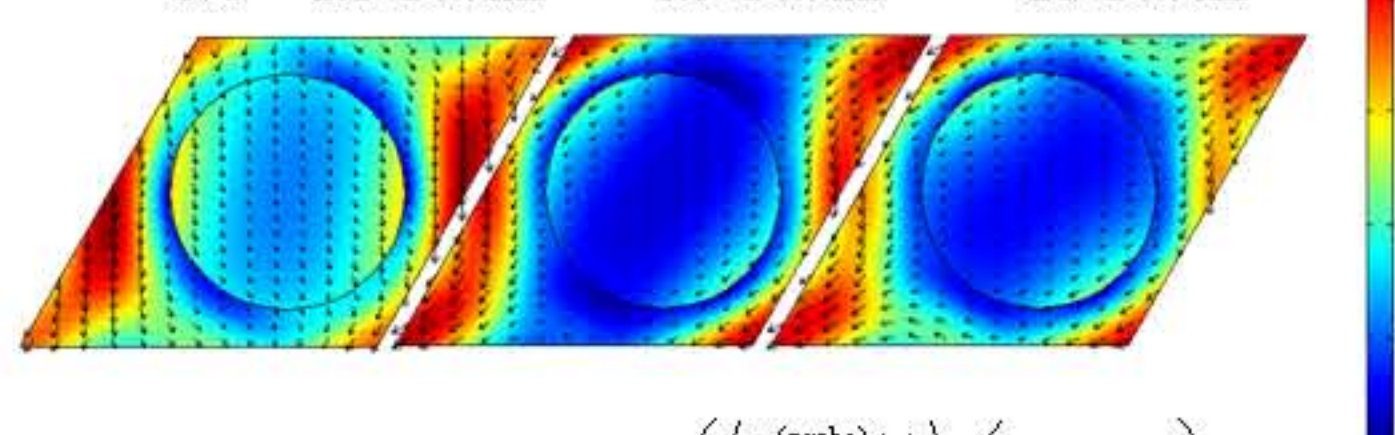
Material response

$P/a^2 = 2.8 \text{ GW/cm}^2, 8.5 \text{ GW/cm}^2, 20 \text{ GW/cm}^2$



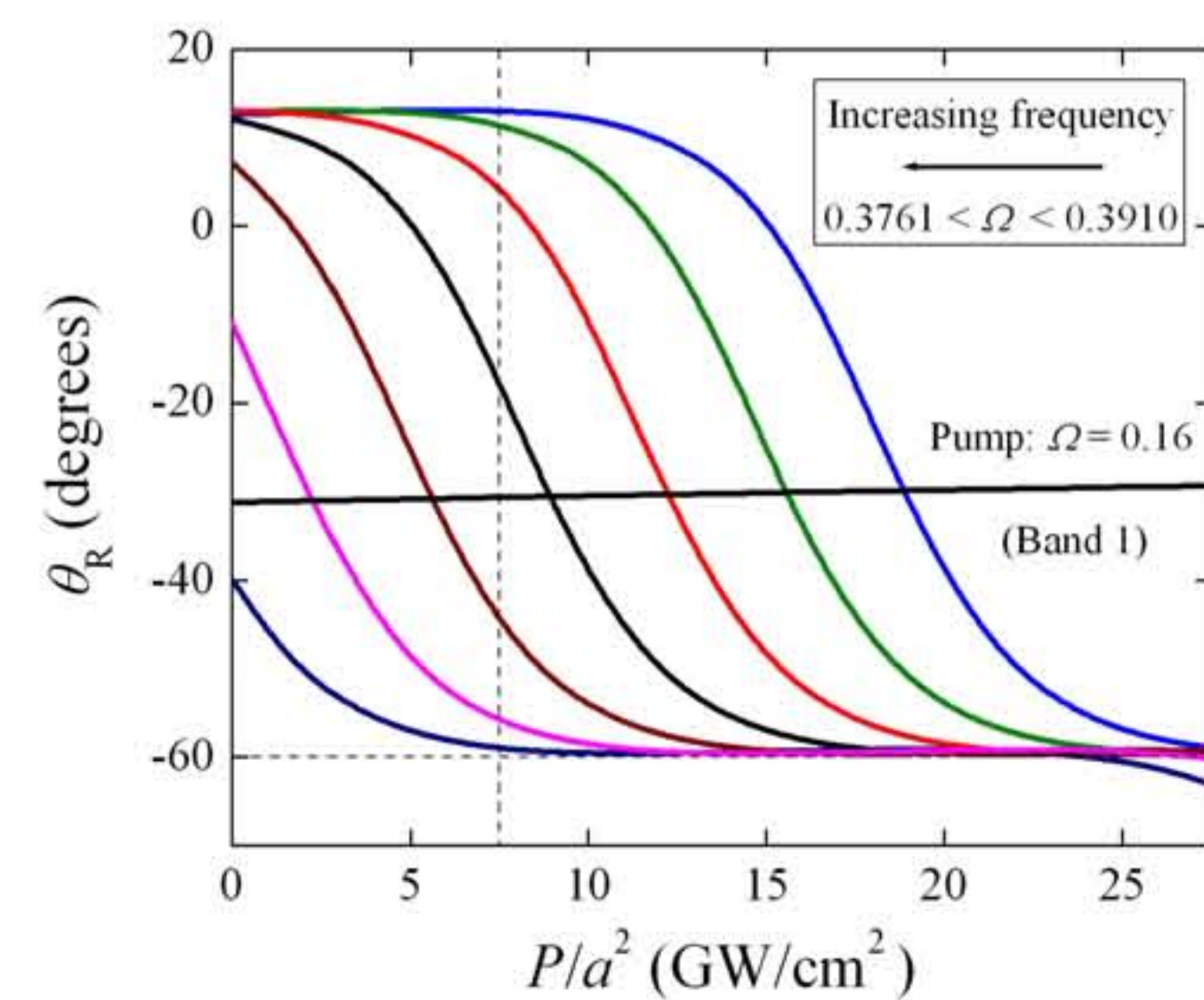
Poynting's vector

$P/a^2 = 2.8 \text{ GW/cm}^2, 8.5 \text{ GW/cm}^2, 20 \text{ GW/cm}^2$

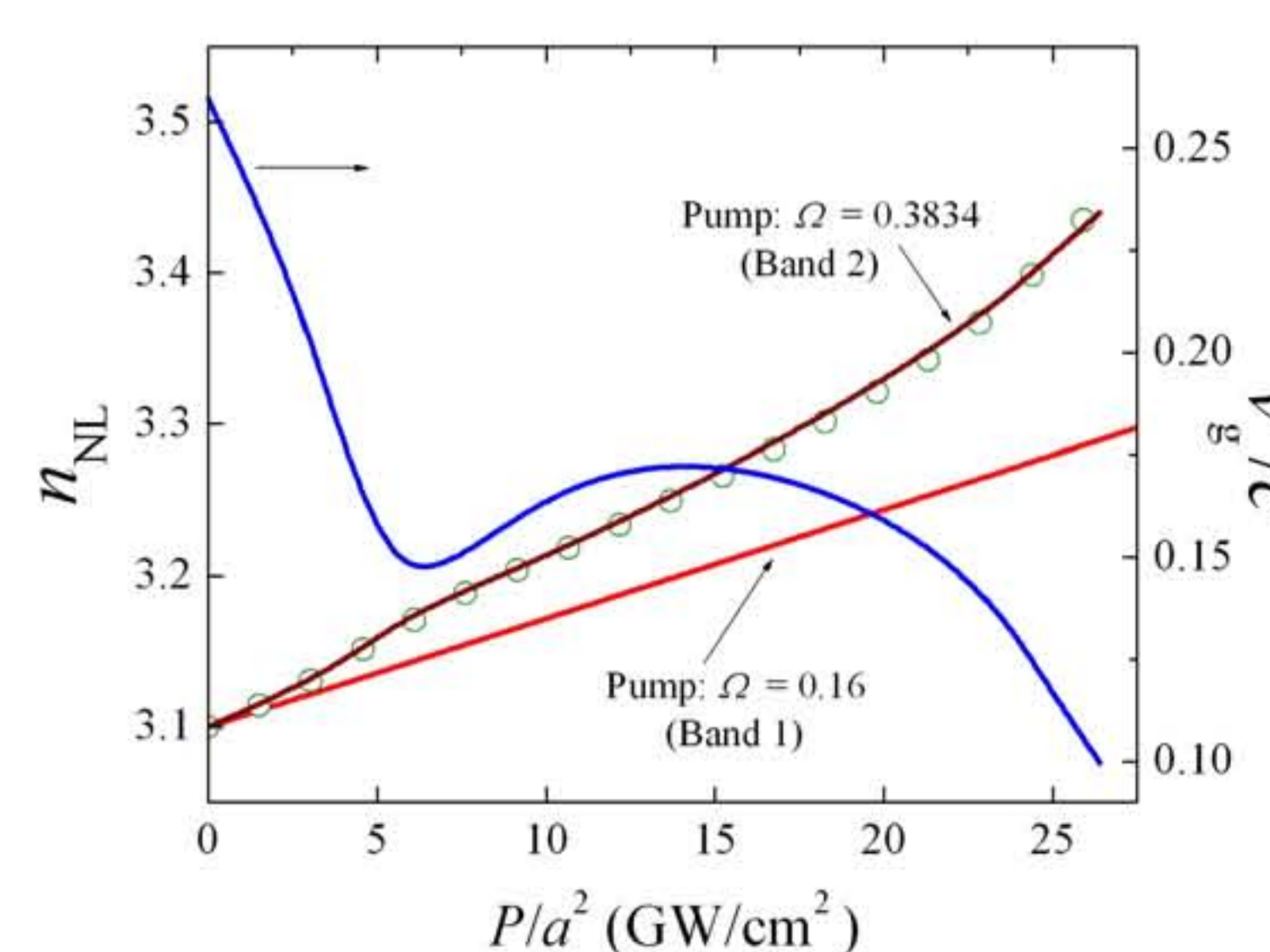


Nonlinear systems...

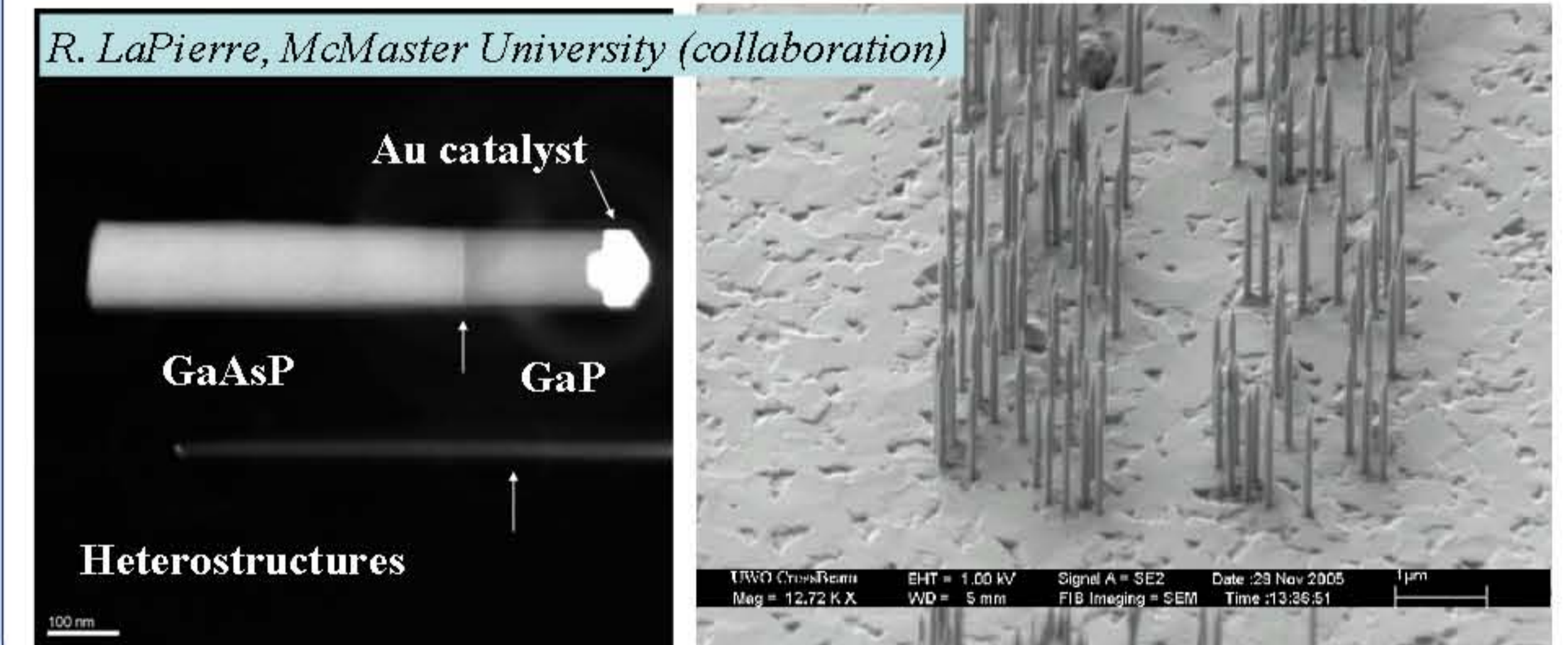
Probe beam refraction (band 1 pumped)



Average refractive index & group velocity



Nanowire Heterostructure Arrays



Optoelectronic Properties

PiN Junction

