

Dielectric spheres on a metal film: photonic and plasmonic effects

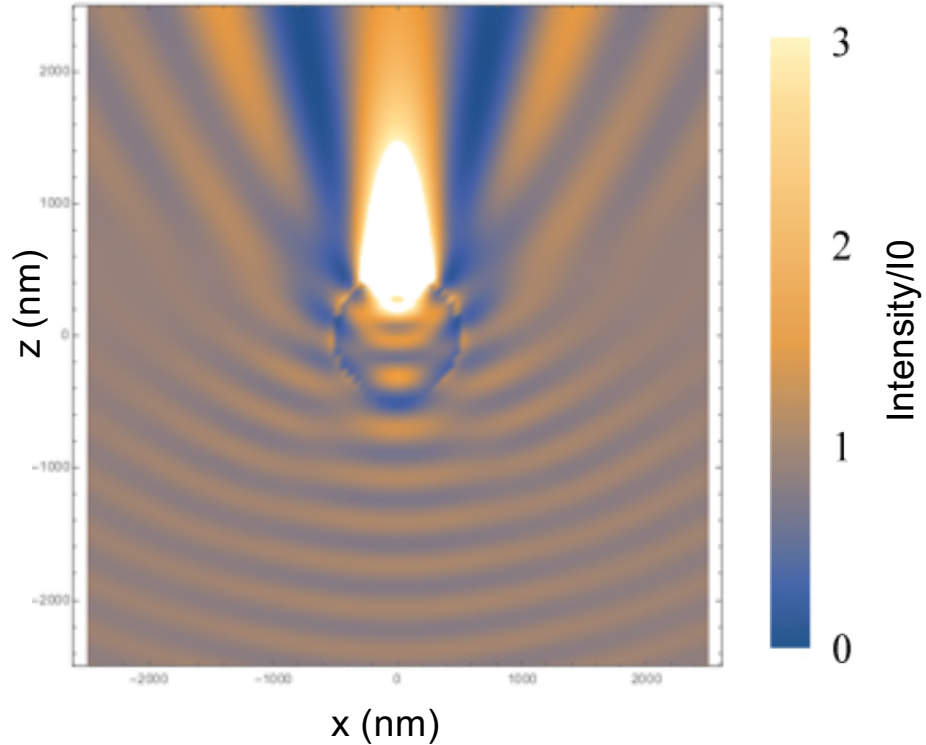
BW Intern: Reed Hodges
PI (theory) and BW Mentor: Dr. Maxim Durach
Georgia Southern University
Statesboro, GA

PI (experiment): Dr. Natalia Noginova
Norfolk State University
Norfolk, VA



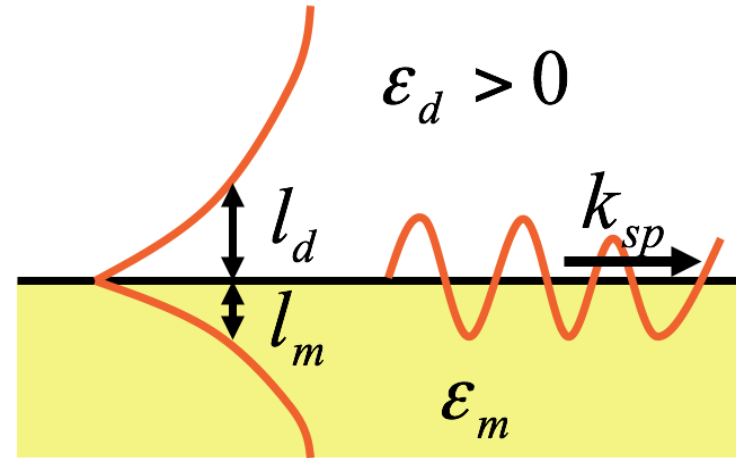
Background: photonic jets

- Focusing of a plane wave by an object on the nano- or microscale



Background: surface plasmon polaritons

- Involve both electron motion in the metal and electromagnetic wave activity
- Negative permittivity of the metal causes an evanescent wave into the metal (skin effect)

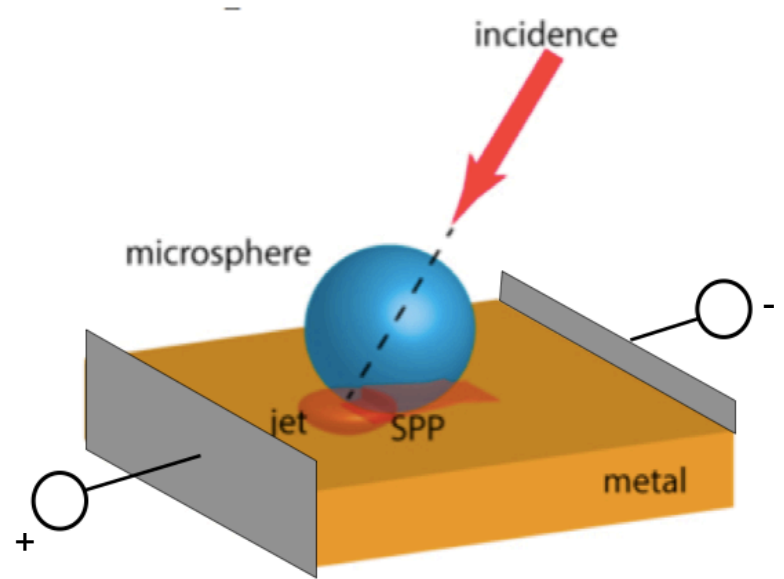


Structure design

- Want to explain experimental results of:

Noginova, N., Rono, V., Jackson, A., & Durach, M. (2015, May). Controlling Plasmon Drag with Illumination and Surface Geometry. In *CLEO: QELS Fundamental Science* (pp. FTh3E-7). Optical Society of America.

- Why do plasmons go backwards?
- Plasmon drag effect: enhanced electrical current by surface plasmons



Tools

- OpenACC and OpenMP at start
- CUDA and MPI for summations
- NetCDF and ParaView for visualization of fields

$$E_{refl} = \sum_{l=1}^{\infty} \sum_{m=-l}^l \left(a_{lm} \mathbf{N}_{lm}^{(3)} + b_{lm} \mathbf{M}_{lm}^{(3)} \right)$$

Thank you!

