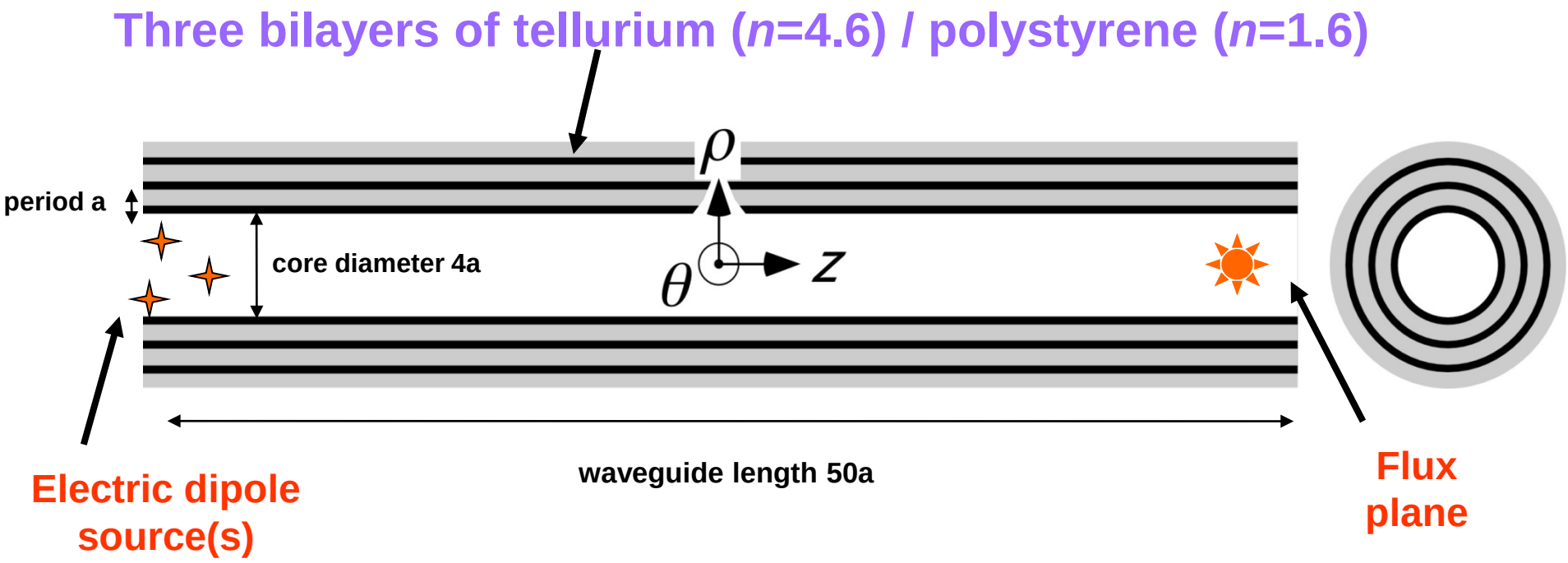
Nanophotonic Modeling Lecture 3.21: Local Density of States in Omniguide Fibers

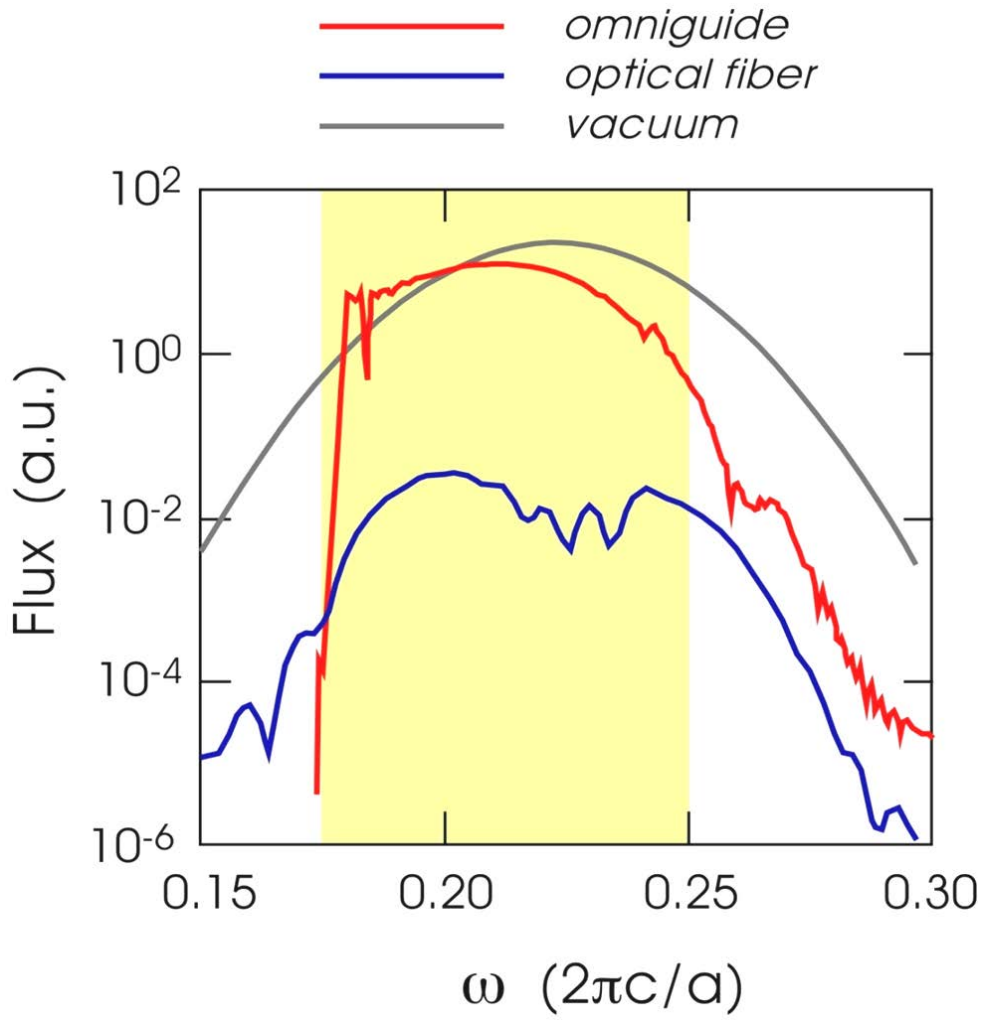
Prof. Peter Bermel

Small-Core Omniguide Fiber



Bermel *et al*., Phys. Rev. B **69**, 035316 (2004)

Purcell effect yields strong emission at cutoff frequency



Bermel *et al*., Phys. Rev. B **69**, 035316 (2004)

Density of States

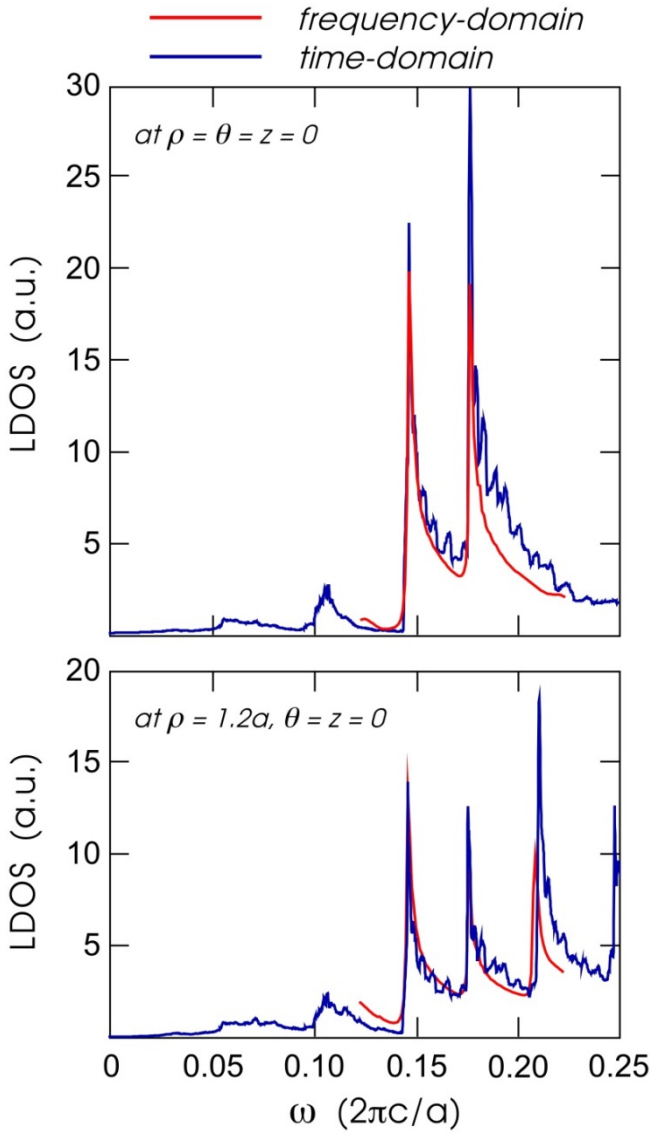
- **Local density of states:**

$$g(\omega, \vec{r}) = \sum_{n,\vec{k}} \epsilon(\vec{r}) \left| \vec{E}_{n\vec{k}}(\vec{r}) \right|^2 \delta(\omega - \omega_{n\vec{k}})$$

- **Predicts high emission near cutoff frequencies:**

$$g(\omega, \vec{r}) \sim \sum_n \frac{|\vec{E}_n(\omega_n r/c)|^2}{\sqrt{\omega - \omega_n}}$$

- **Time domain calculation agrees with semi-analytic bandstructure calculation (Gilat-Raubenheimer method)**



Bermel *et al*., Phys. Rev. B **69**, 035316 (2004)