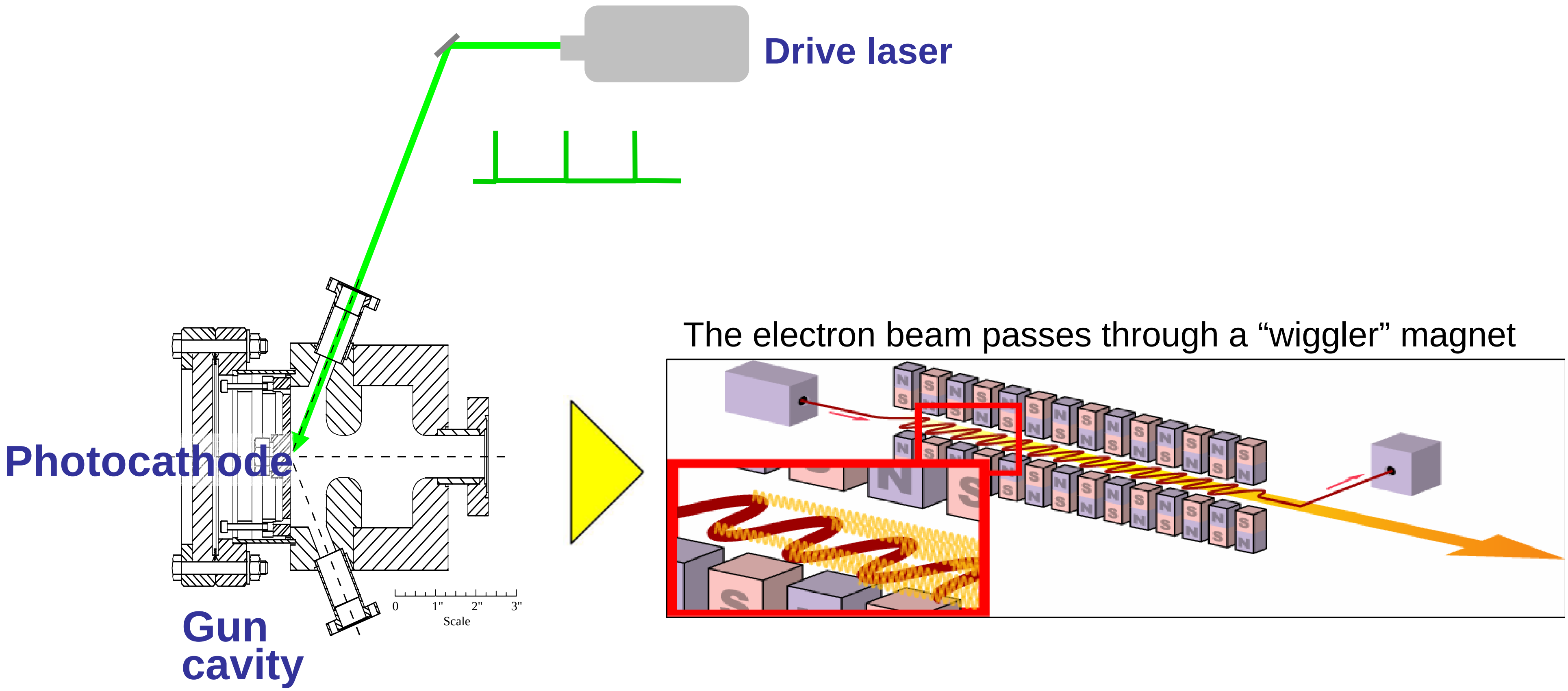
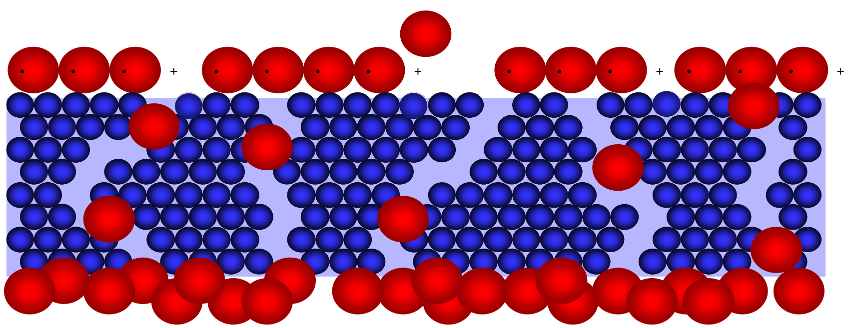
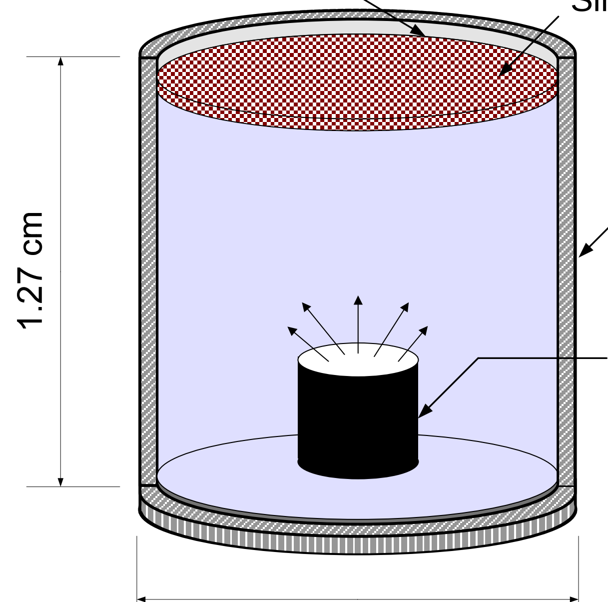
Schematic Overview of a Free Electron Laser



Prototype Dispenser Photocathode

Goal: in-situ re-cesiation





Foundation for Computational Diffusion Model

- Cs atoms on the surface of a metal have no preferred direction of diffusion.

- Cs diffuses at the same rate out of each pore of the dispenser.

- Cs atoms stick well to the surface, not to themselves, forming a monolayer or less.

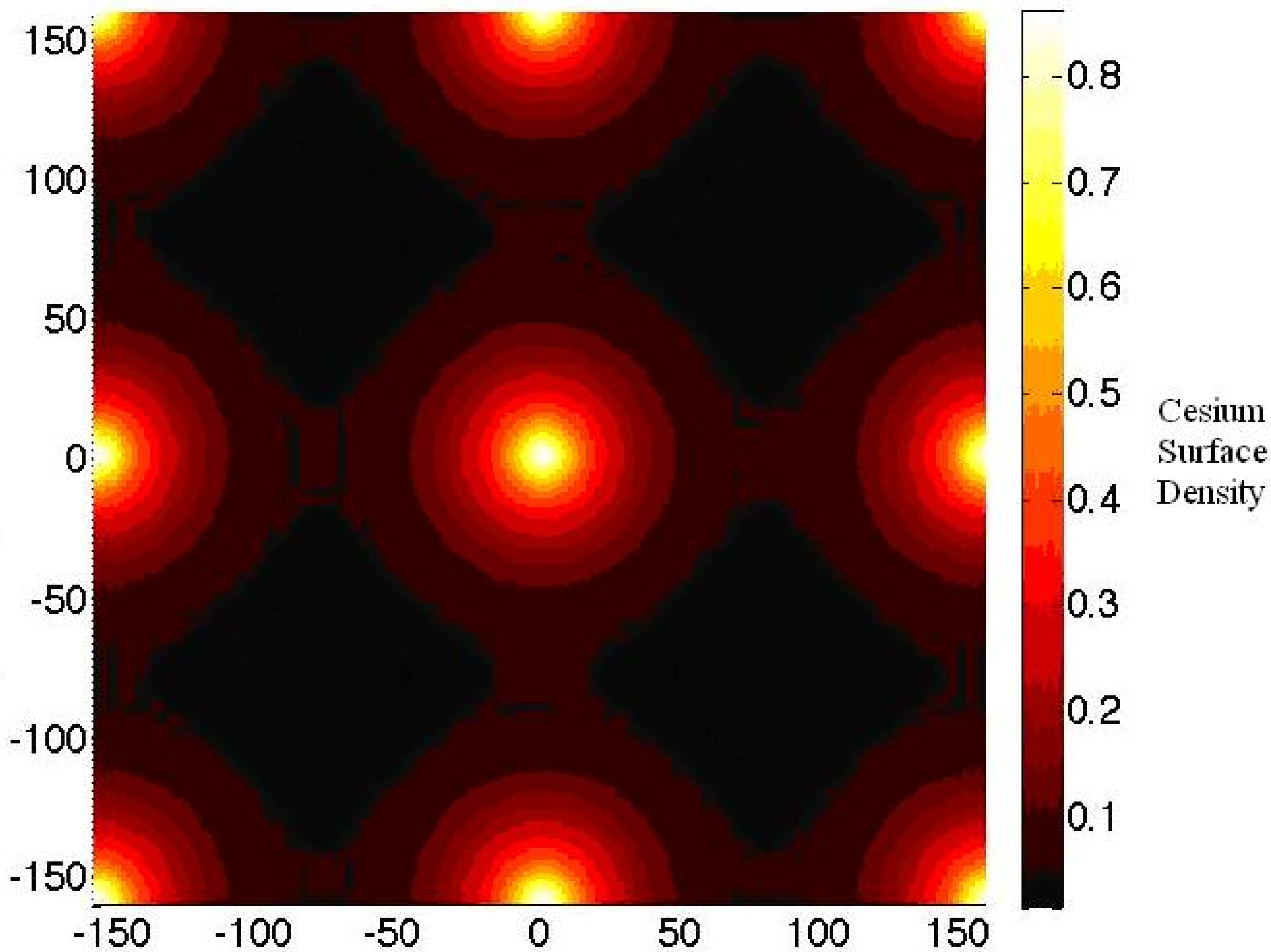
- Coverage of Cs refers not to “thickness” but rather to the percent of one monolayer present on the surface.

$$\phi = -d \cdot u_x$$

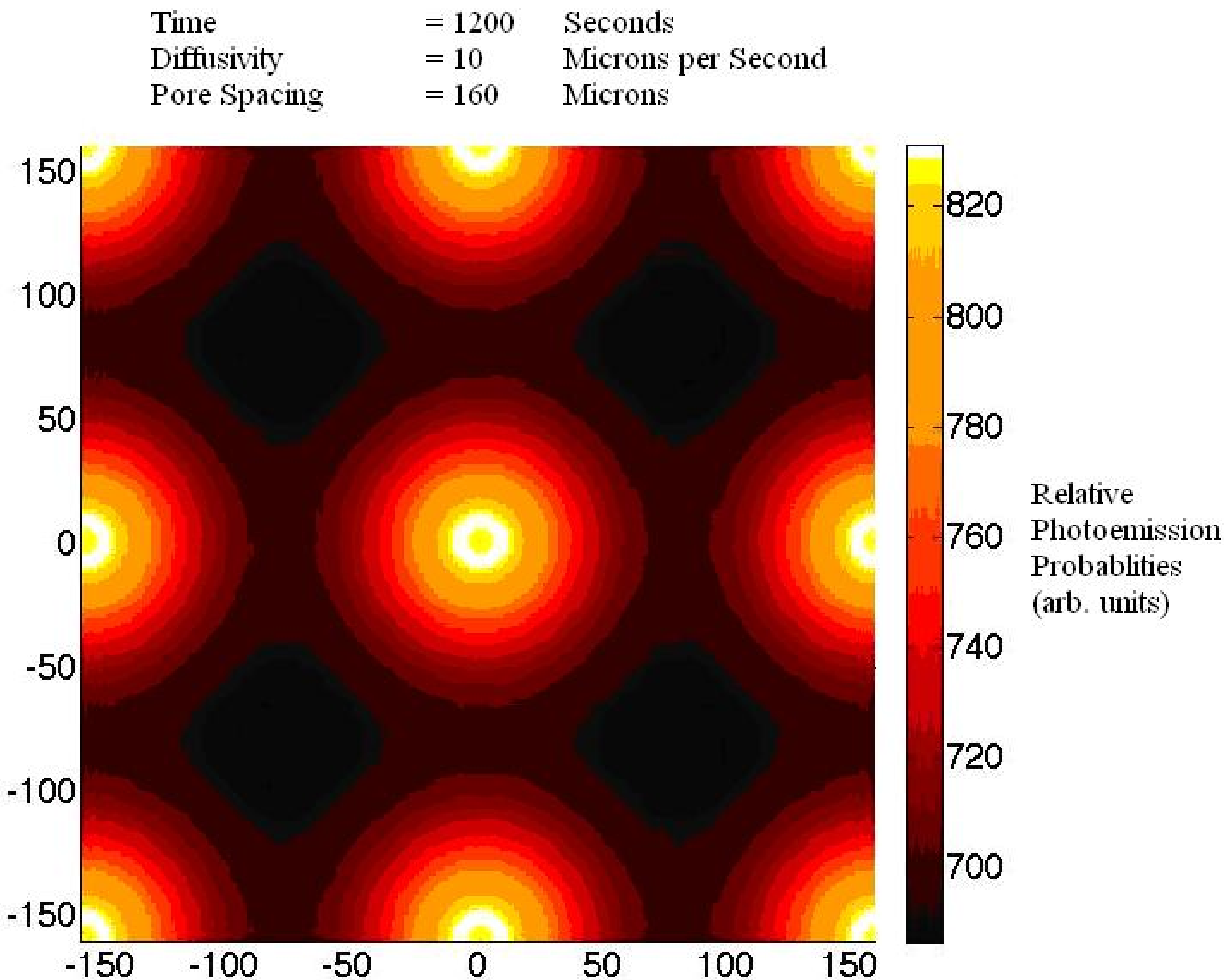
Fick’s Law of Diffusion

Time Snapshot of Cs Density

Time	= 1200	Seconds
Diffusivity	= 10	Microns per second
Pore Spacing	= 160	Microns

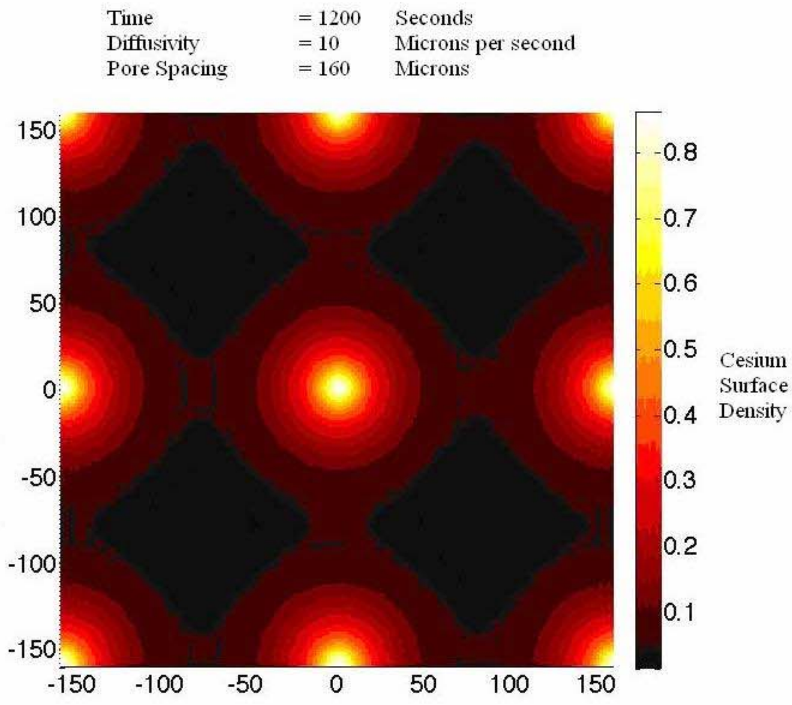


Time Snapshot of Relative Emission Probability

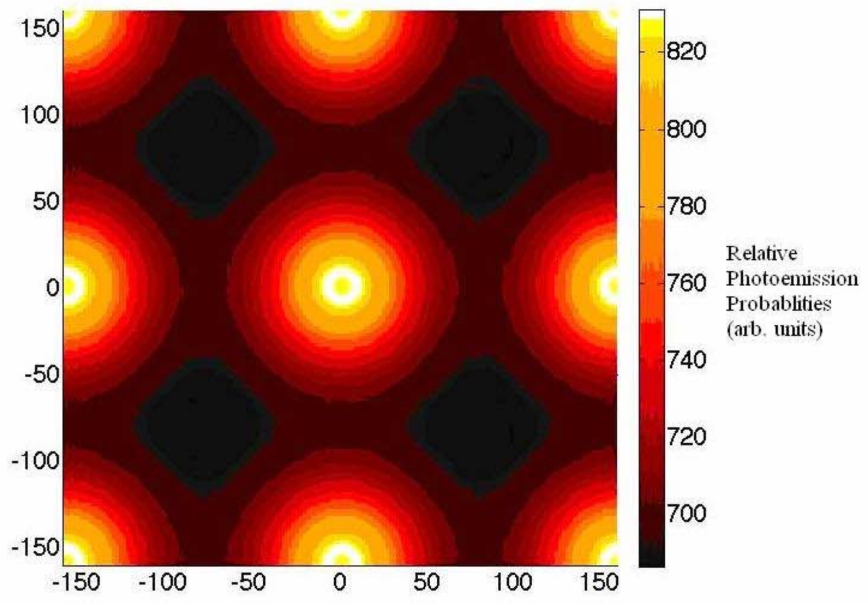


Time Snapshot of Cs Density and Relative Photo-emission Probability

Cs Density



Relative Photo-emission Probability



Future Work

- Direct experimental data for Cs density over time on a dispenser photocathode is soon to be obtained by collaborators at the Naval Research Laboratory

- Cs evaporation needs to be included in future models

- Validated model will be used to design and optimize a controlled porosity dispenser cathode