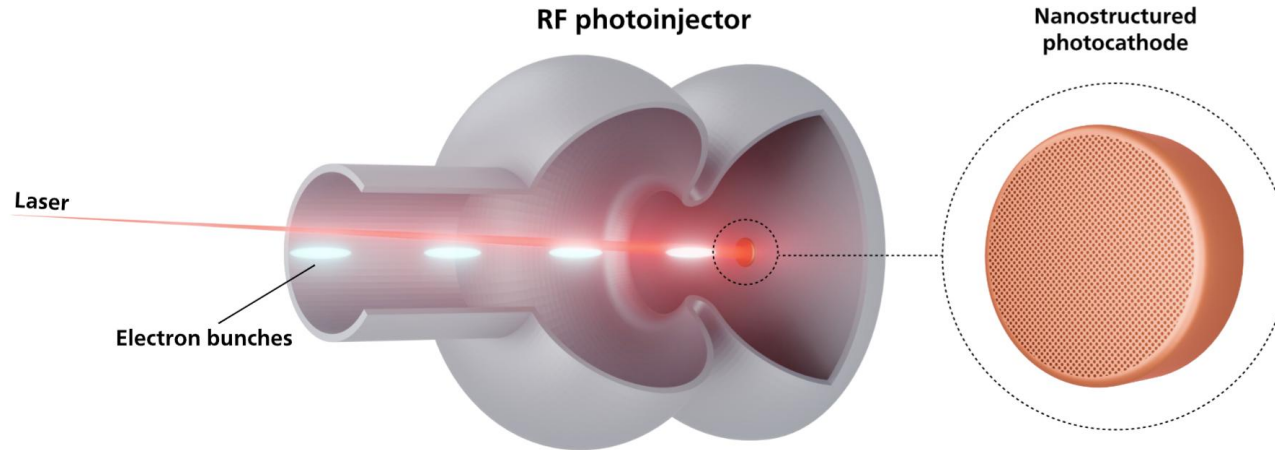


Simulation study of nanostructured plasmonic metallic photocathodes

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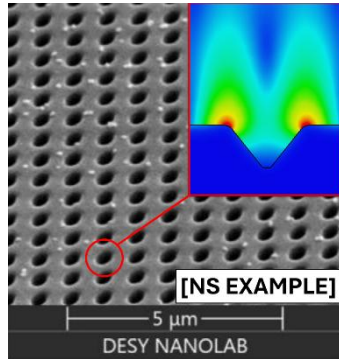
Surface-plasmon enhanced photoemission → higher QE

Plasmonic nanostructured photocathodes

Surface-plasmon
resonance

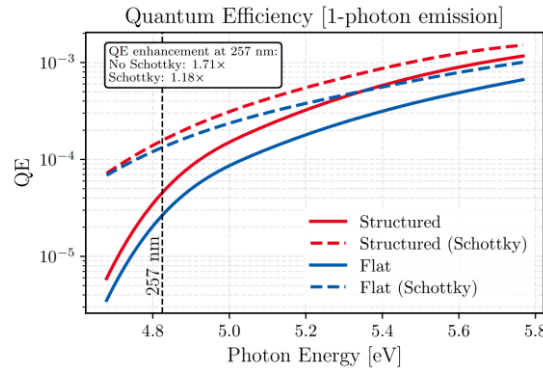
QE enhancement

Beam quality
degradation

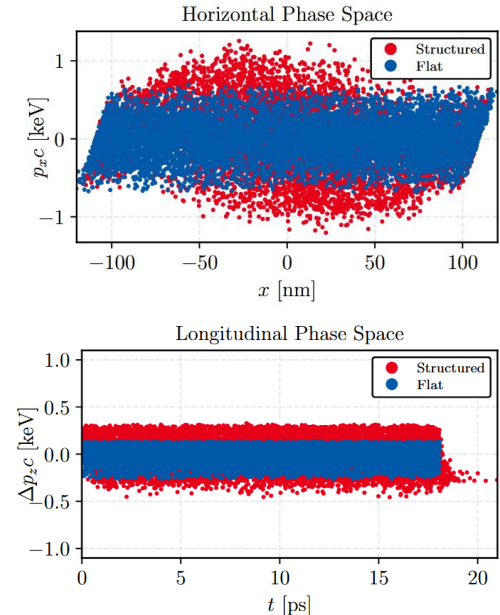


Picture: DESY Nanolab

Nanostructuring:
FIB milling



257 nm (UV): **<71%** enhancement
800 nm (IR): **orders** of magnitude



Nanostructured photocathode simulation

FDTD simulation (EM fields) → Photoemission model → PIC beam dynamics

Electromagnetic simulation

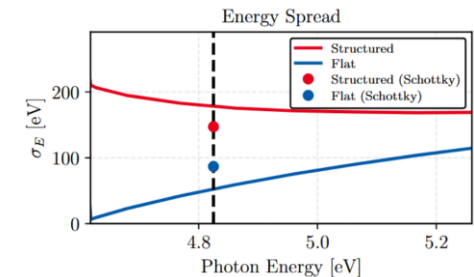
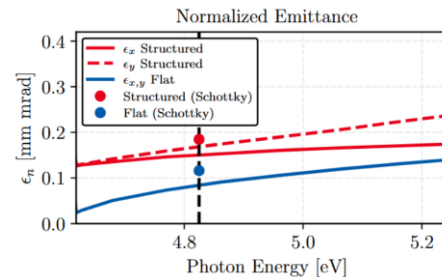
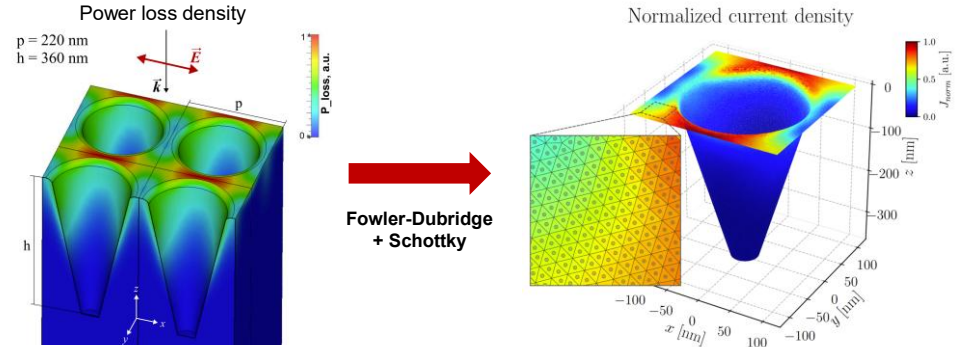
- Plane wave excitation
- Geometry optimization

Photoemission model

- Spatially-resolved photocurrent calculation
- Emission samples (particle interface)

Beam dynamics

- PIC simulation (cathode vicinity)
- Analysis



Application:

- Metallic photocathodes, surface roughness
- Outlook: structured semiconductors