



Contribution ID: 743 Contribution code: TUPA002

Type: **Poster Presentation**

## **Simulation of plasmonic effects in nanostructured copper surfaces for field-assisted photoemission**

*Tuesday, 9 May 2023 16:30 (2 hours)*

We propose a simulation model of the field enhancement and quantum efficiency (QE) increase of metallic surfaces as a result of a surface nanostructuring. In the framework of photoinjector facilities for electron accelerators at CERN, achieving optimal nanostructuring parameters may become a significant asset. The presence of a well-designed periodic surface topography can give rise to plasmonic resonance and coupling effects within the structures, which yields a local increase in electron density and an electric field enhancement. This model is used to provide a deeper insight into these effects. We investigate the dependency of the electron emission enhancement on the nanopattern geometry and incident wavelength on the plasmonic resonance. We examine, based on former experimental results, the performance of Laser Induced Periodic Surface Structures (LIPSS) and other types of periodic nanoscale features, but we also demonstrate the surprisingly strong contribution of nanoparticles in the global field enhancement of the surface. These particles are a common side effect of ultrafast laser surface processing and themselves exhibit unique plasmonic resonance properties.

### **Funding Agency**

### **Footnotes**

### **I have read and accept the Privacy Policy Statement**

Yes

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**Session Classification:** Tuesday Poster Session

**Track Classification:** MC2: Photon Sources and Electron Accelerators: MC2.T02: Electron Sources