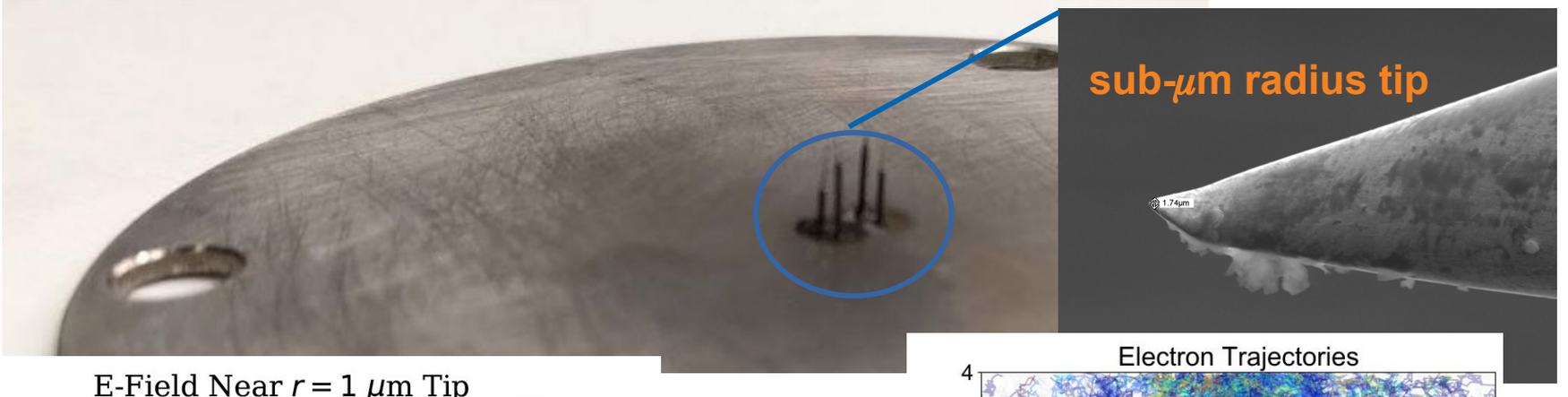
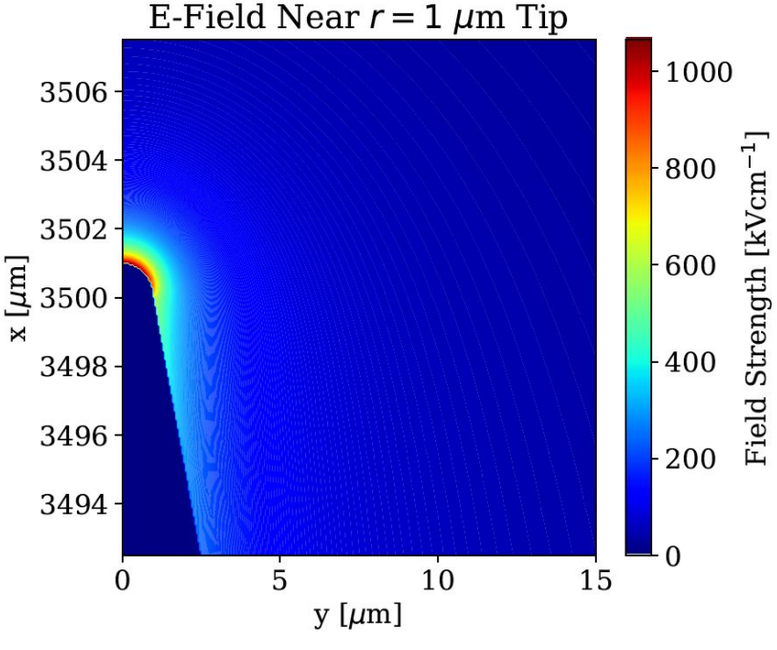
Electron multiplication in liquid argon TPC detectors for low energy rare event physics

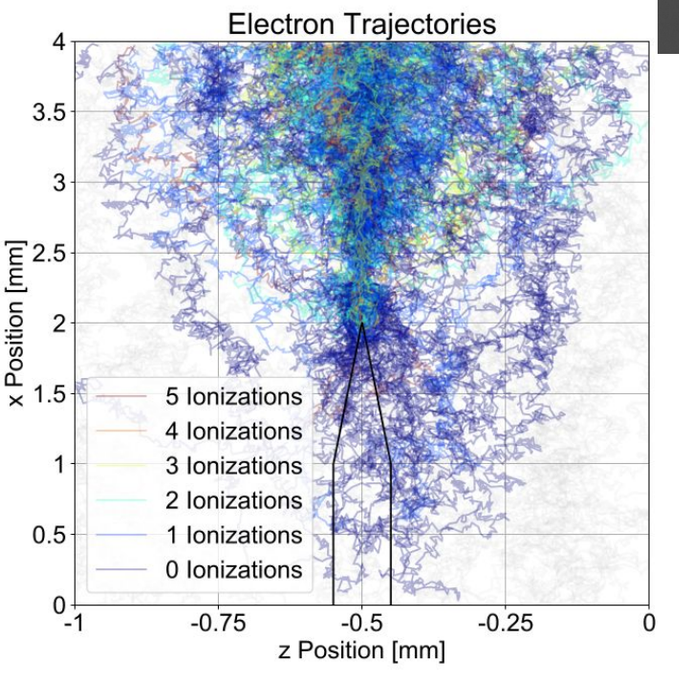
D. Caratelli, A. Fava, J. Zettlemoyer
Fermi National Accelerator Laboratory





COMSOL simulation of E-field in tip geometry

+



Micro-physics simulation of electron propagation, scattering, and ionization in argon

Executive Summary

Instrumentation requirements to achieve physics goals (list)

- Gain level and corresponding NR threshold.
- Position resolution.
- Detailed physics reach (e.g. sensitivities) and complementarity w.r.t. other efforts.

Significant instrumentation challenges (list)

- Meeting geometric requirements for proportional amplification.
- Stability of achieved gain.
- Scalability of technology for large volumes.

Relevant physics areas (e.g., low-mass DM, solar neutrino oscillations, CEvNS)

- Primary interest [subjective] is expanding physics reach of CEvNS. Other applications possible.