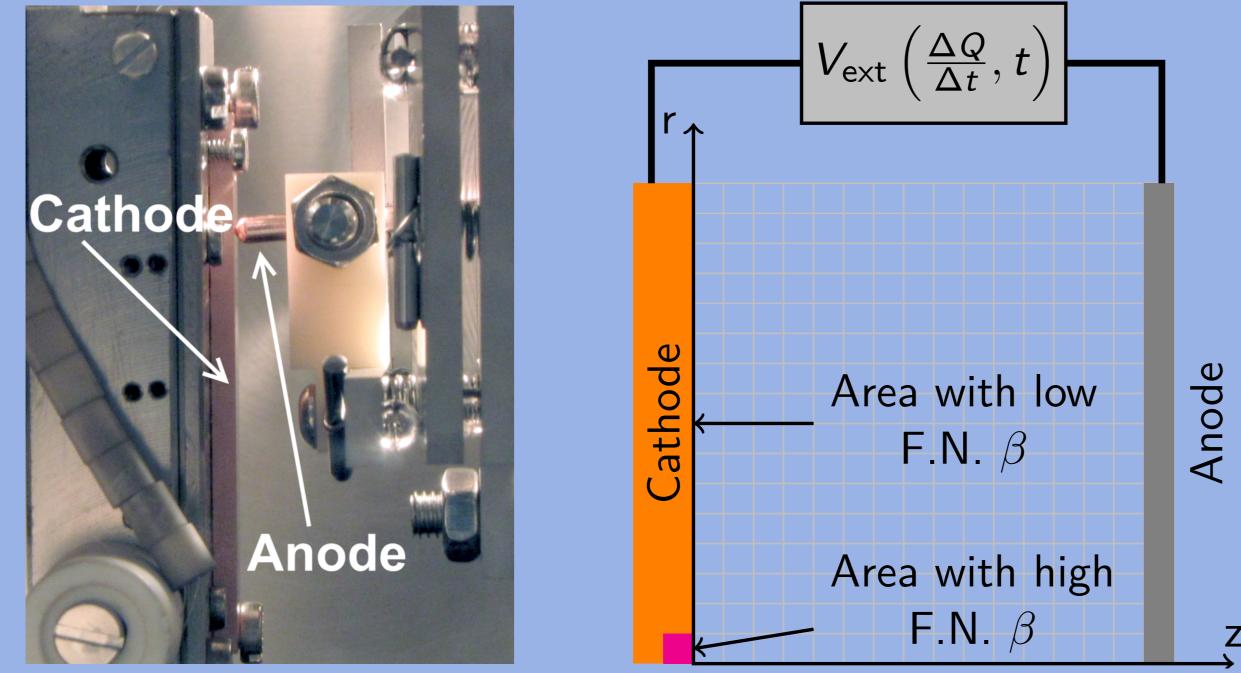


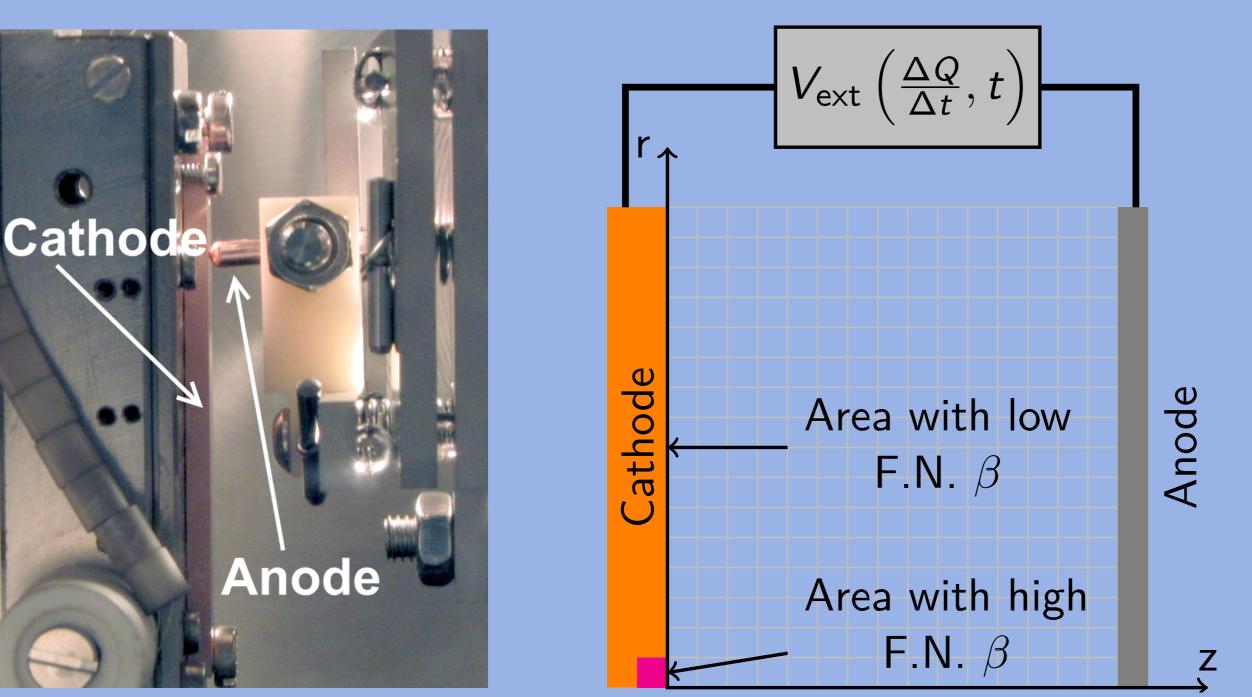
ArcPic 2D: **Code capabilities**



Kyrre Sjobak, Lotta Mether, Helga Timkó and Walter Wuensch

Simulated system





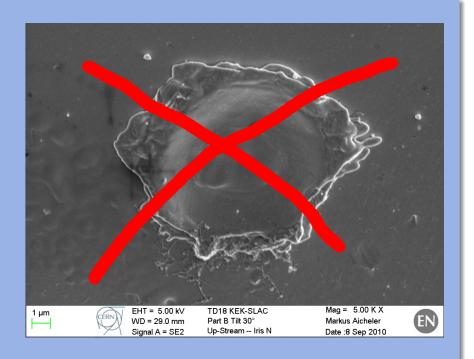
ArcPIC 2D in a nutshell

- 2d3v electrostatic PIC with MC collisions in cylindrical coordinates
- Planar electrode geometry, with high-emission area in center
- Pure copper plasma \Rightarrow simulated species:
- Modelling the DC spark experiment at CERN
- $\approx 10 \text{ kV}$ over a gap distance $\approx 20 \ \mu \text{m}$
- Lab testing of breakdown physics (rate, material/processing dependency, field, ...)
- Especially interested in breakdown **triggering**

 e^{-} , Cu, Cu^{+} (no Cu^{2+} etc.) • Highly modular system for circuit and emission models

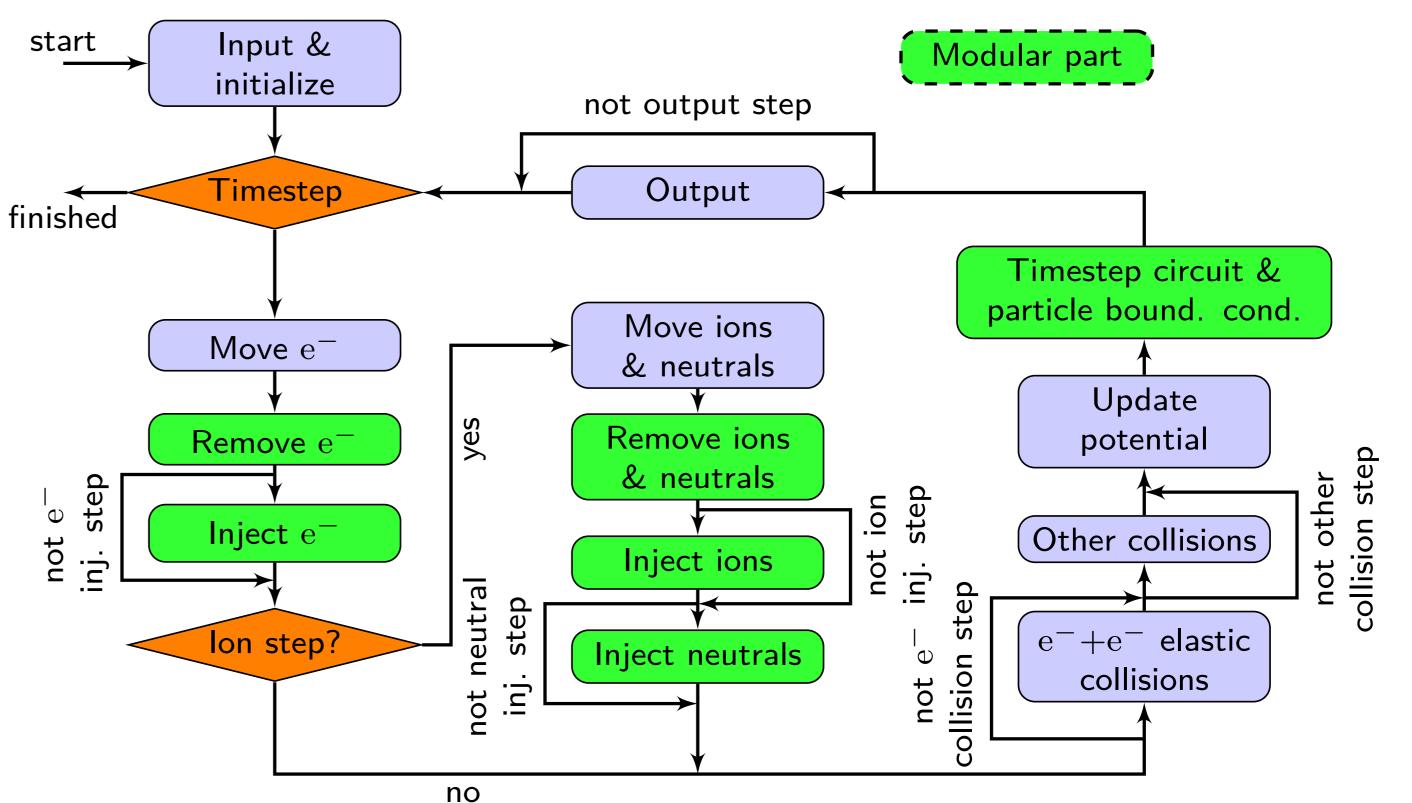
Motivation

Understanding how arcs in high gradient RF structures are triggered, enabling design of even higher-gradient RF structures.



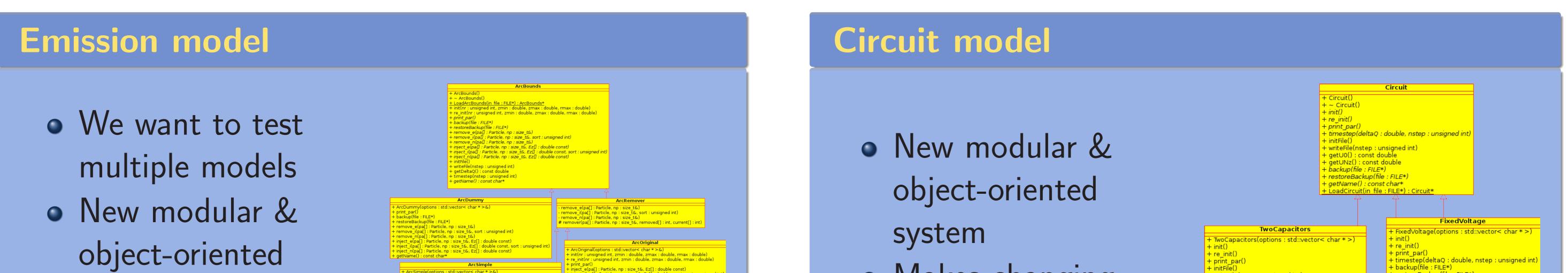
How the simulation is built

 Simulation based on work by Helga Timkó • Written in C++





- Several improvements were made:
 - Modularization of physics models
 - New pre-collision sorting implementation \Rightarrow Less memory use
 - More modern techniques (OO, STL) introduced ⇒ better performance & maintainability
 - Usability improvements
- This makes it easier to produce simulations and test physics models





MevArc 2012, Albuquerque

- \Rightarrow Adding / changing models simple \Rightarrow No risk of interfering with rest of program
- Old emission model now "just another class" easy to keep for reference
- Emission model classes may provide extra output • Functionality can be shared among models with help of inheritance
- Makes changing the model simple \Rightarrow No risk of interfering with rest of program when changing a model \Rightarrow Adapting to new experimental setups • Model classes may provide extra output



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