Simulation of a single GEM chamber with SoLID GEMC

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Primary tasks

- Simulate a single rectangular GEM chamber response with MeV x-rays
- 4-6 MeV x-rays used in medical applications
- Precursor: simulate GEM response with beta source (suggested by Zhiwen)

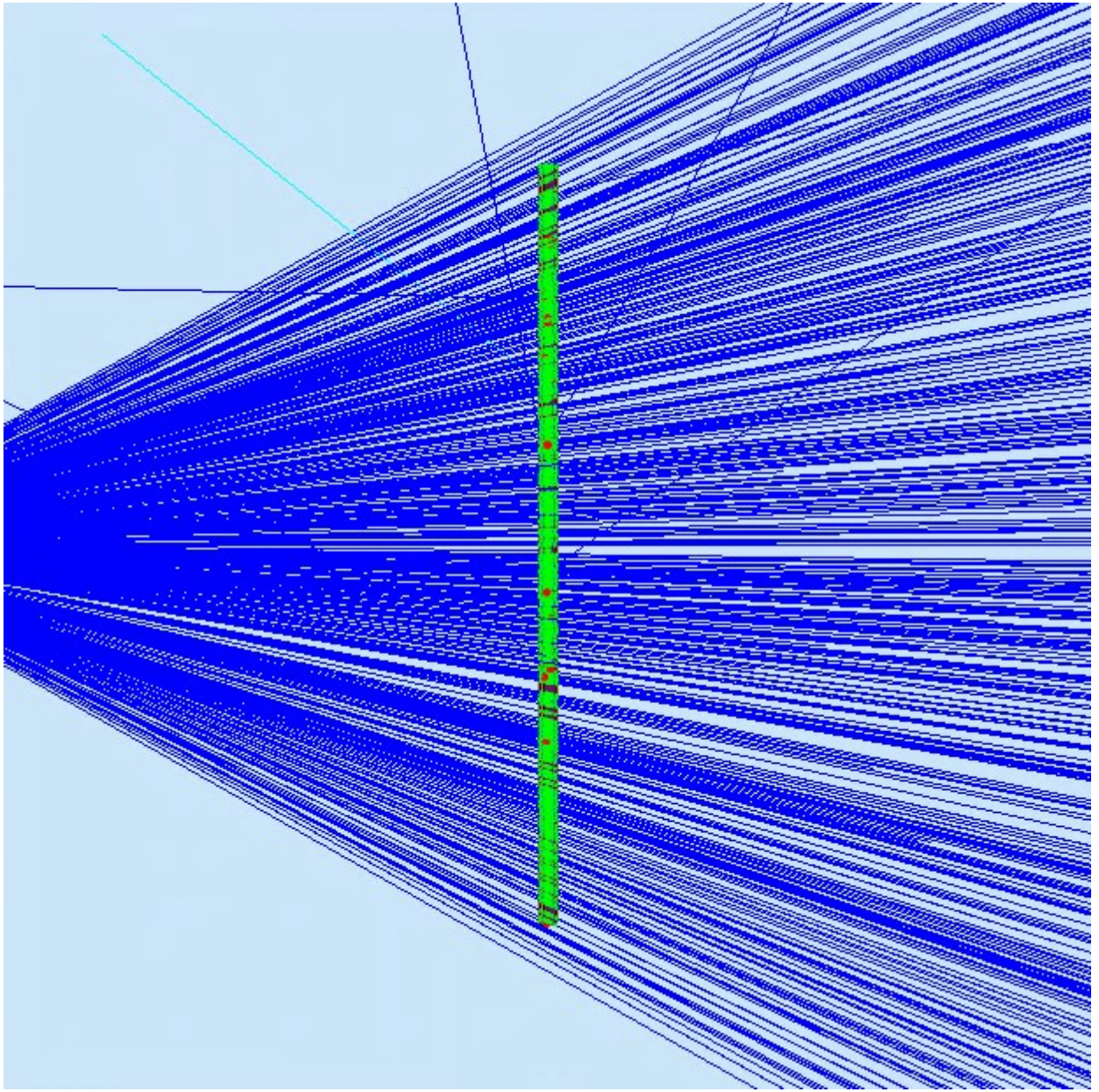
Software used

- SoLID GEMC
- Digitization program
- Geant4 (used to write input LUND file)

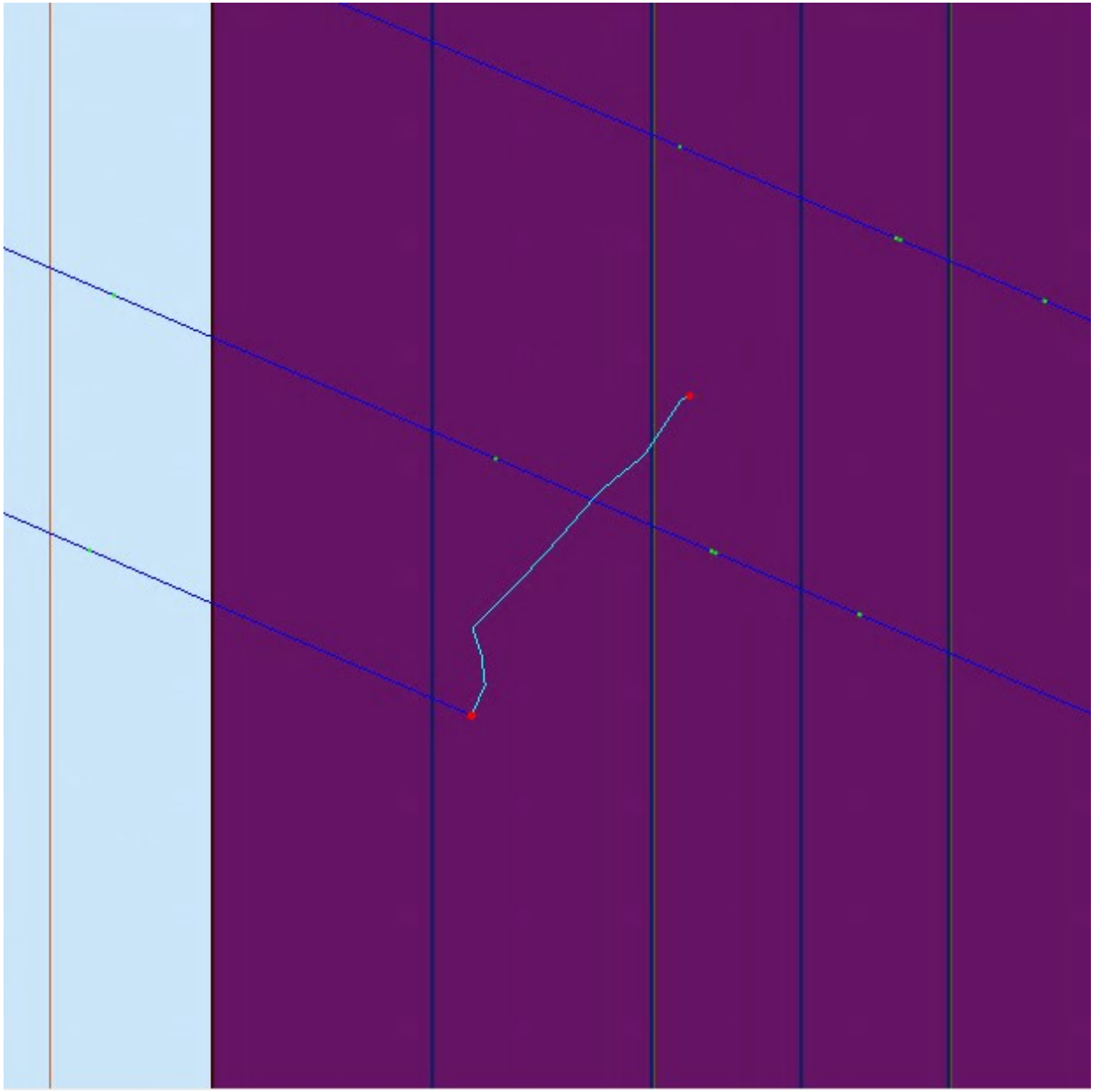
SoLID GEMC

- Installed JLab CE v1.3 on U.Va. Cluster
- Installed SoLID GEMC
- Created SVN checkout, which included detector
- Ran trials with detector in vis. mode to debug
- Accomplished this with much help from Zhiwen

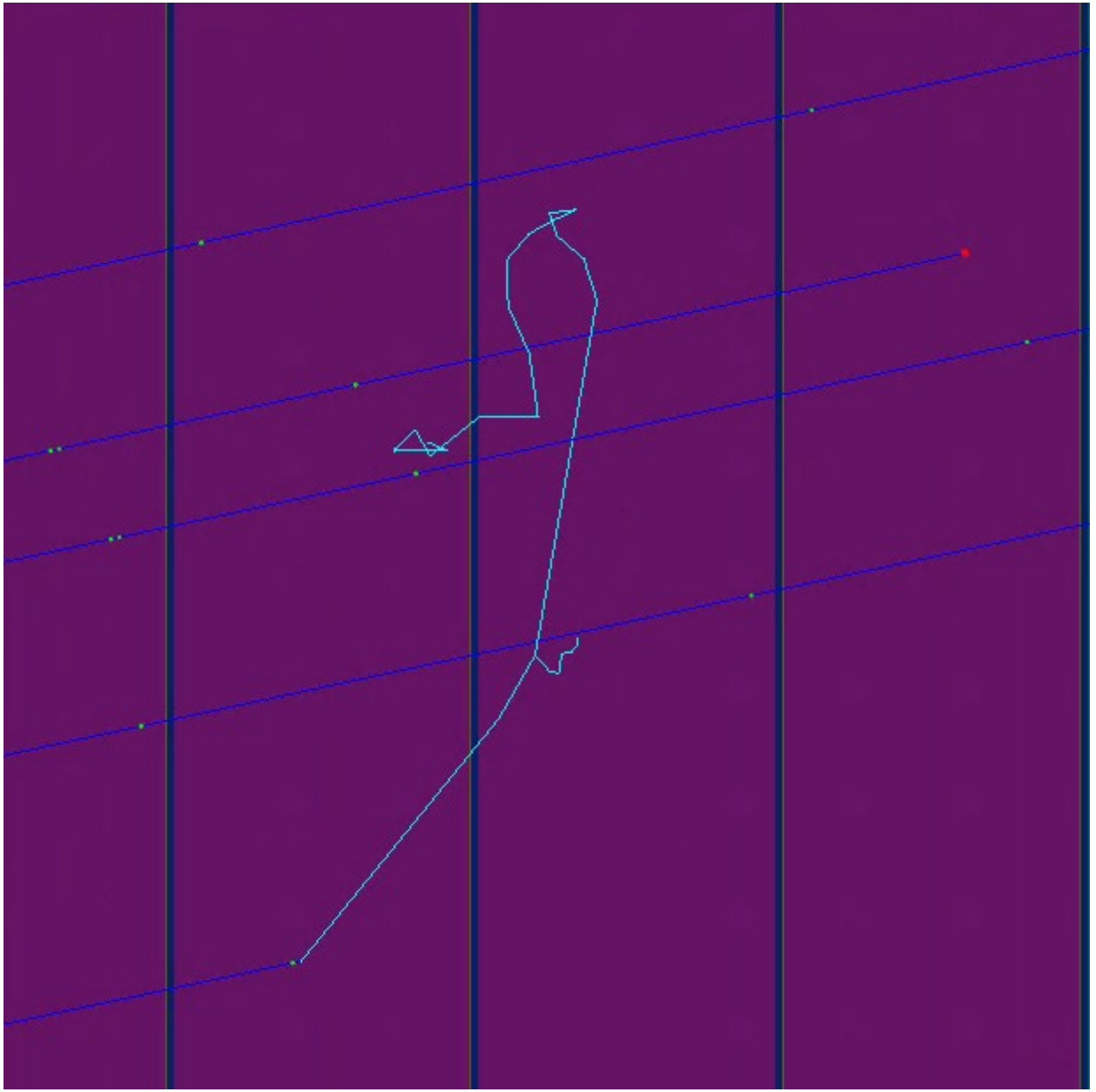
SoLID GEMC



SoLID GEMC



SoLID GEMC



Digitization program

- Met with Weizhi at JLab in July to discuss
- Created an installation on U.Va. cluster
- Turned on all verbosity flags
- Tracked a single particle through digitization

Geant4

- Bremmstrahlung spectrum, plan to use LUND
- First idea: write Perl script with numerical approx.
- Better idea: use physics processes in Geant4
- Run simulation, write output file in LUND format
- Specifically: MedLinac2 and RadioactiveDecay

Next steps

- Run simulation trials with LUND files from G4
- Beta source and x-ray tube
- Run lab trials with Sr-90, x-ray tube
- Compare lab trials with simulation
- Run simulation with 4-6 MeV x-rays

Acknowledgements

- Zhiwen Zhao – much help with GEMC, etc.
- Weizhi Xiong – helped with digitization program