Simulations of LoKI

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Outline

- BANDGEM highlights
- Technical aspects
- Properties to look at

Technical maturity status

- The BANDGEM detector geometry is an advanced implementation example in the framework

- And so is the entire LoKI geometry

  - in terms of G4 shapes, logical volume definition and placements, and incorporating a modular geometry into another without copying it by hand

    dg_dgcode/packages/Projects/SansLoki/G4/G4GeoLoki/

    dg_dgcode/packages/Projects/SansLoki/G4/LokiAna/

- Analysis-wise the implementation is quite mature and has been copied in other projects

  → my mistakes have been propagated :-)

- Code in place for conversion/detection efficiencies, scattering effects, spatial resolution, garfield corrections with external input (electron collection efficiency)

BANDGEM geometry & simulations
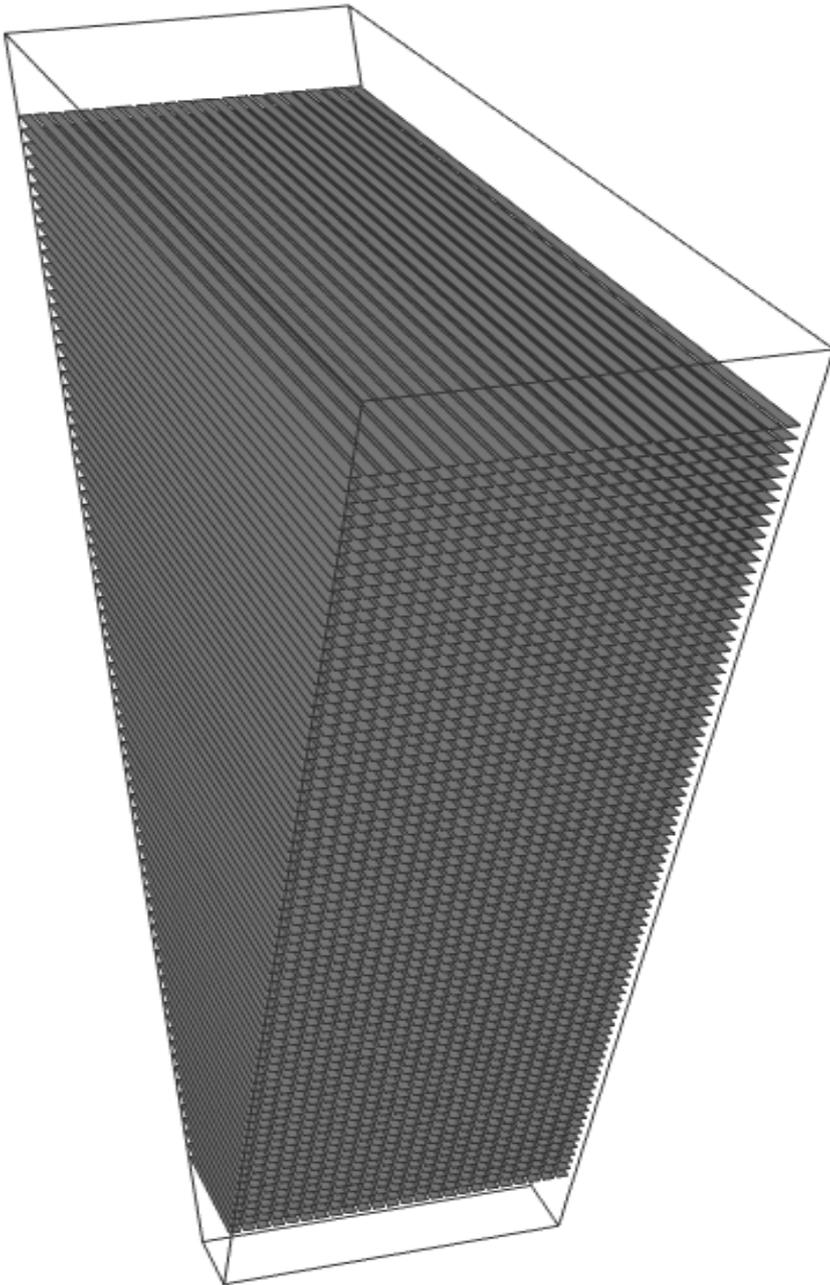
- Simulated efficiency (IDL code) validated with experiment

- More detailed studies are in progress

- Experimental data analysis in progress on scattering and spatial resolution

- Simulations on the same topic pending

- https://ess-ics.atlassian.net/wiki/display/DG/BAND-GEM

Particle guns tailored to anode geometry
and customized analysis aimed for spatial resolution studies
(not documented yet)

Neutrons aimed at a single anode pad,
an example of combining geometry
and generator attributes
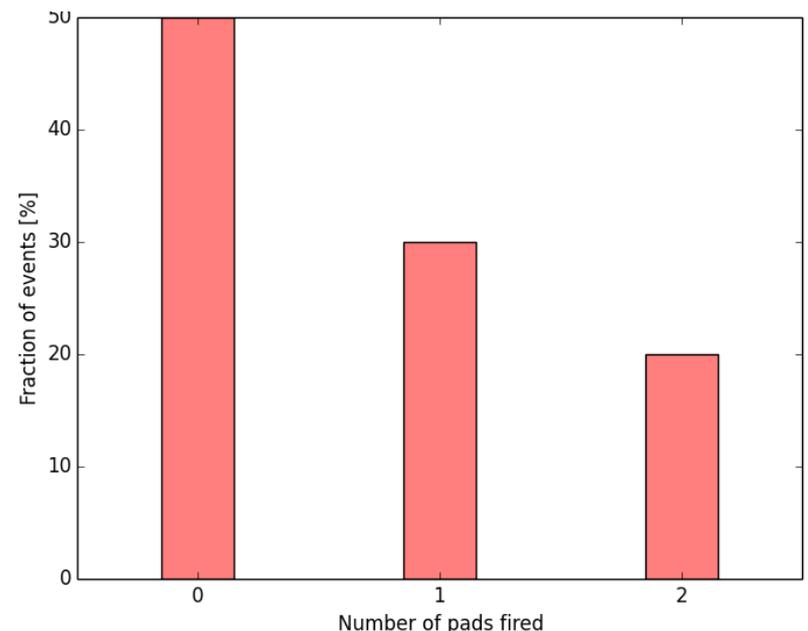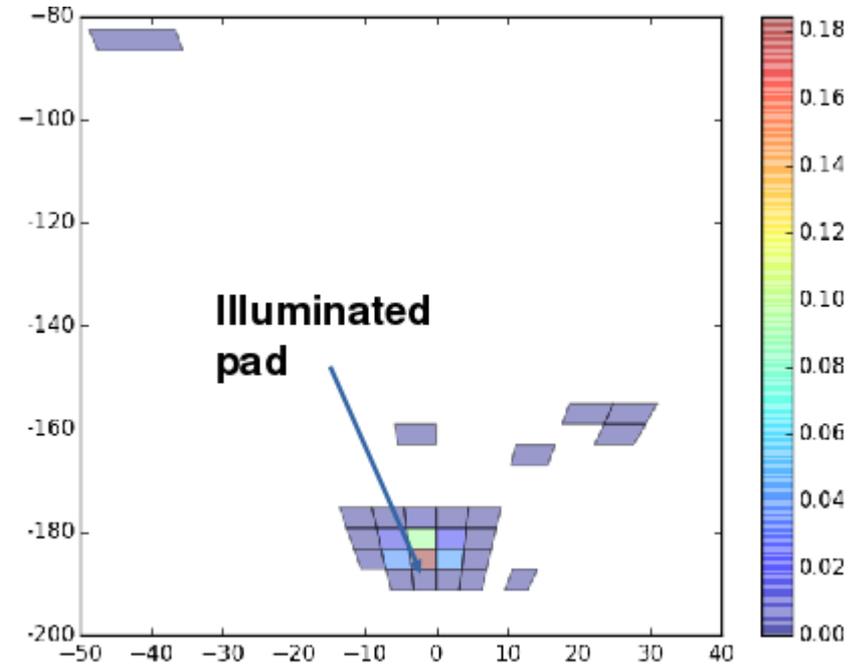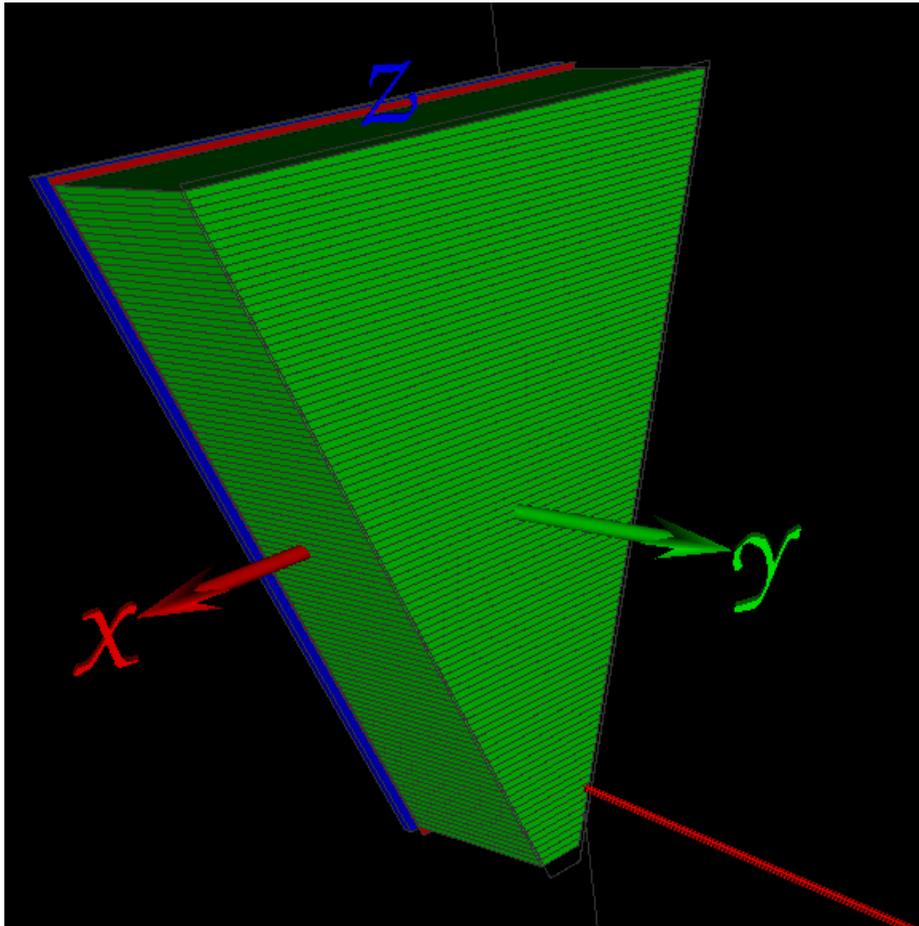
Window Frame Geometry of LoKI

A BANDGEM trapezoidal module is placed several times, covering polar angles up to 50 degrees and full azimuth
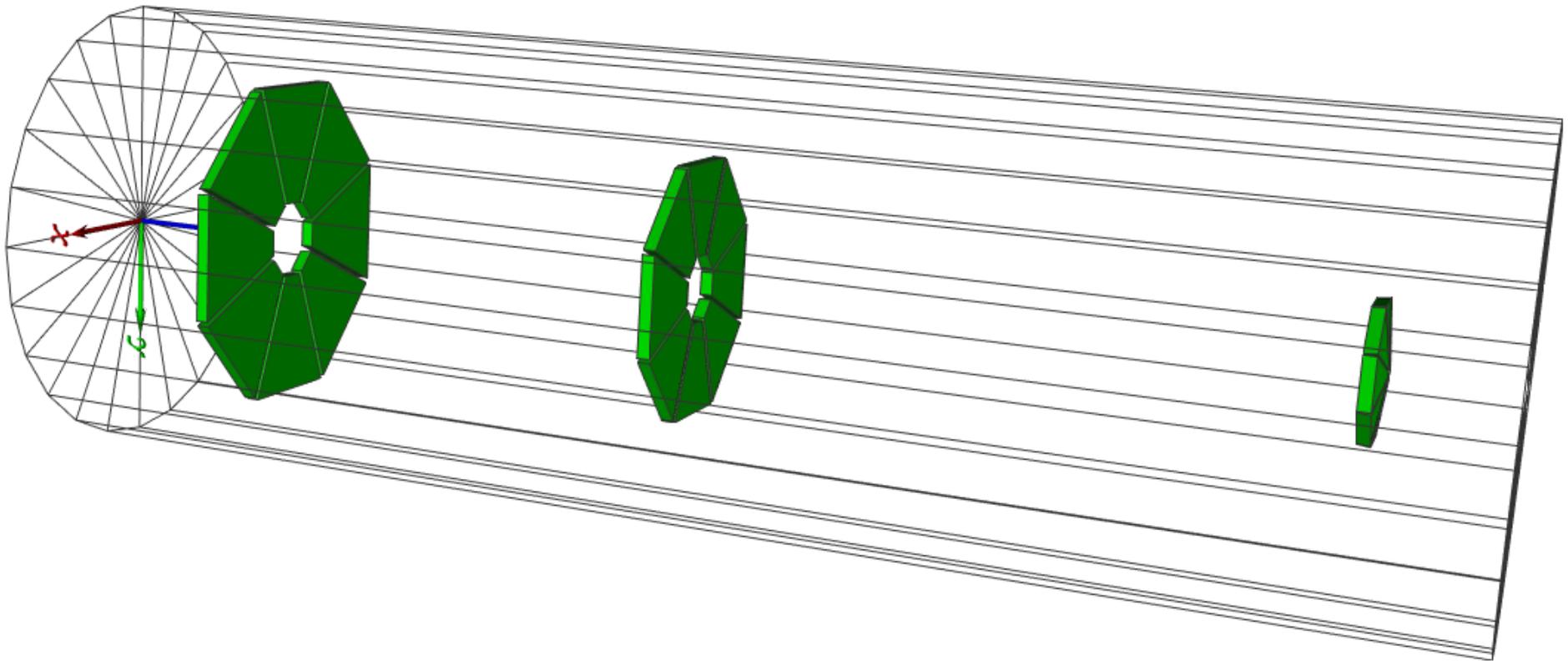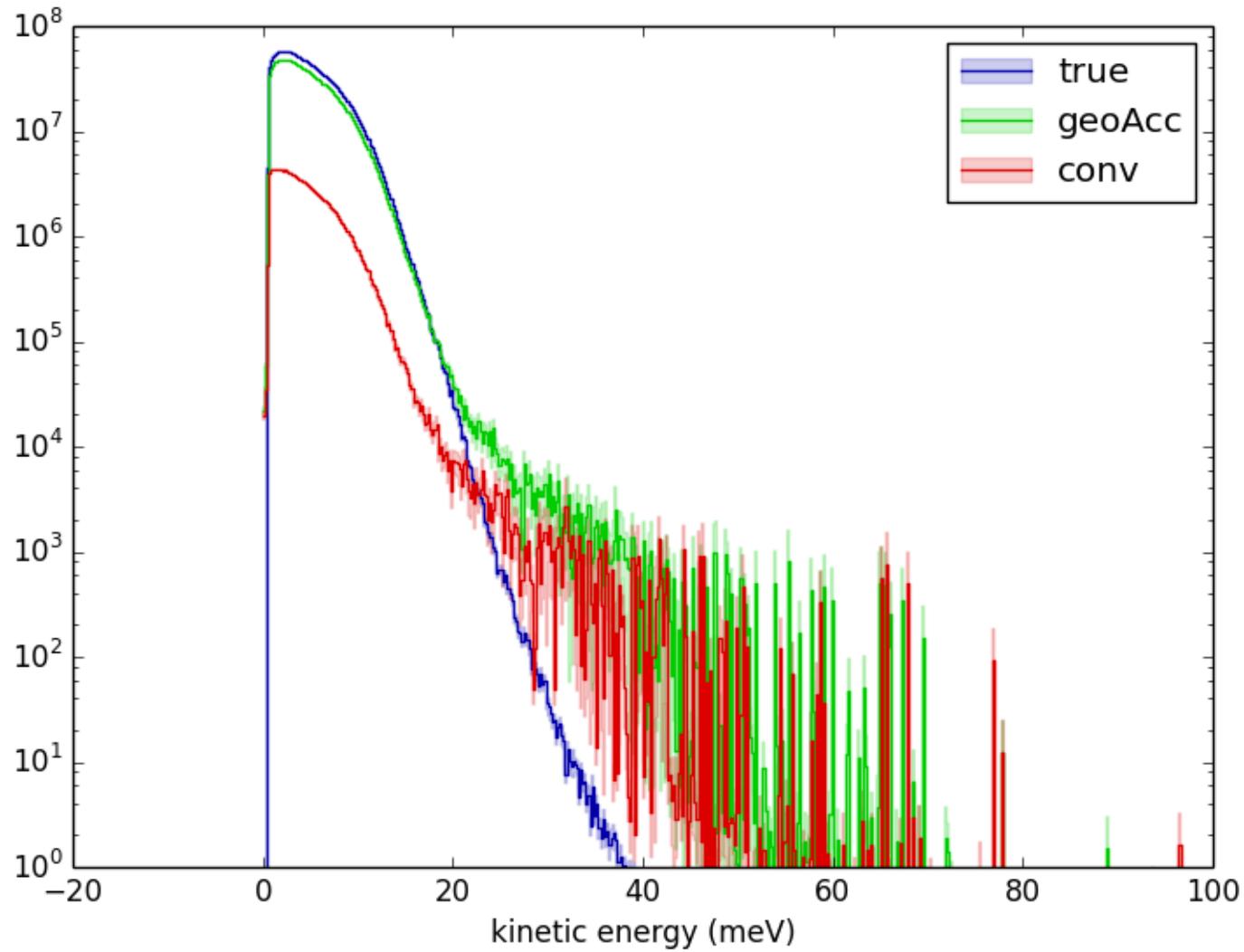
- Results with monochromatic neutrons on efficiency
  https://indico.esss.lu.se/event/405/

- Preliminary "results" with McStas input (spheres model, R=500 Å) following, not interpreted or understood yet

λ vs. θ distribution from McStas sample

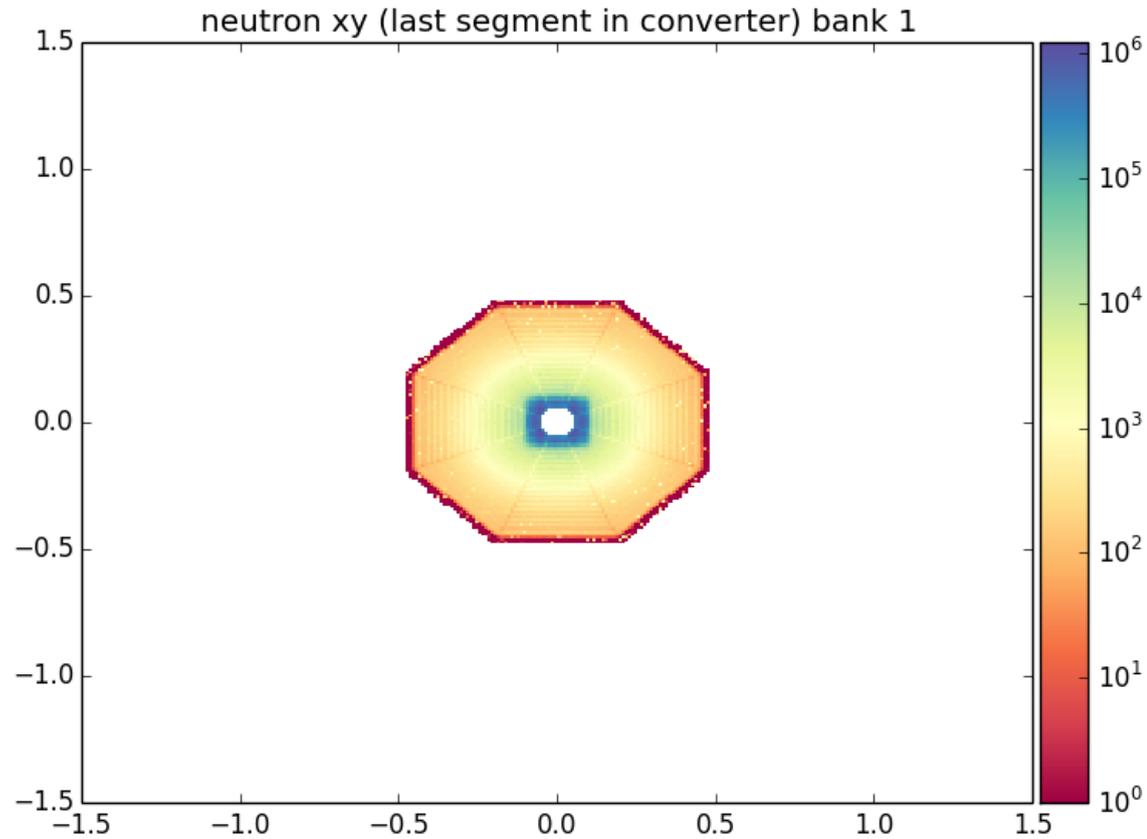neutron lambda vs. theta (all events)
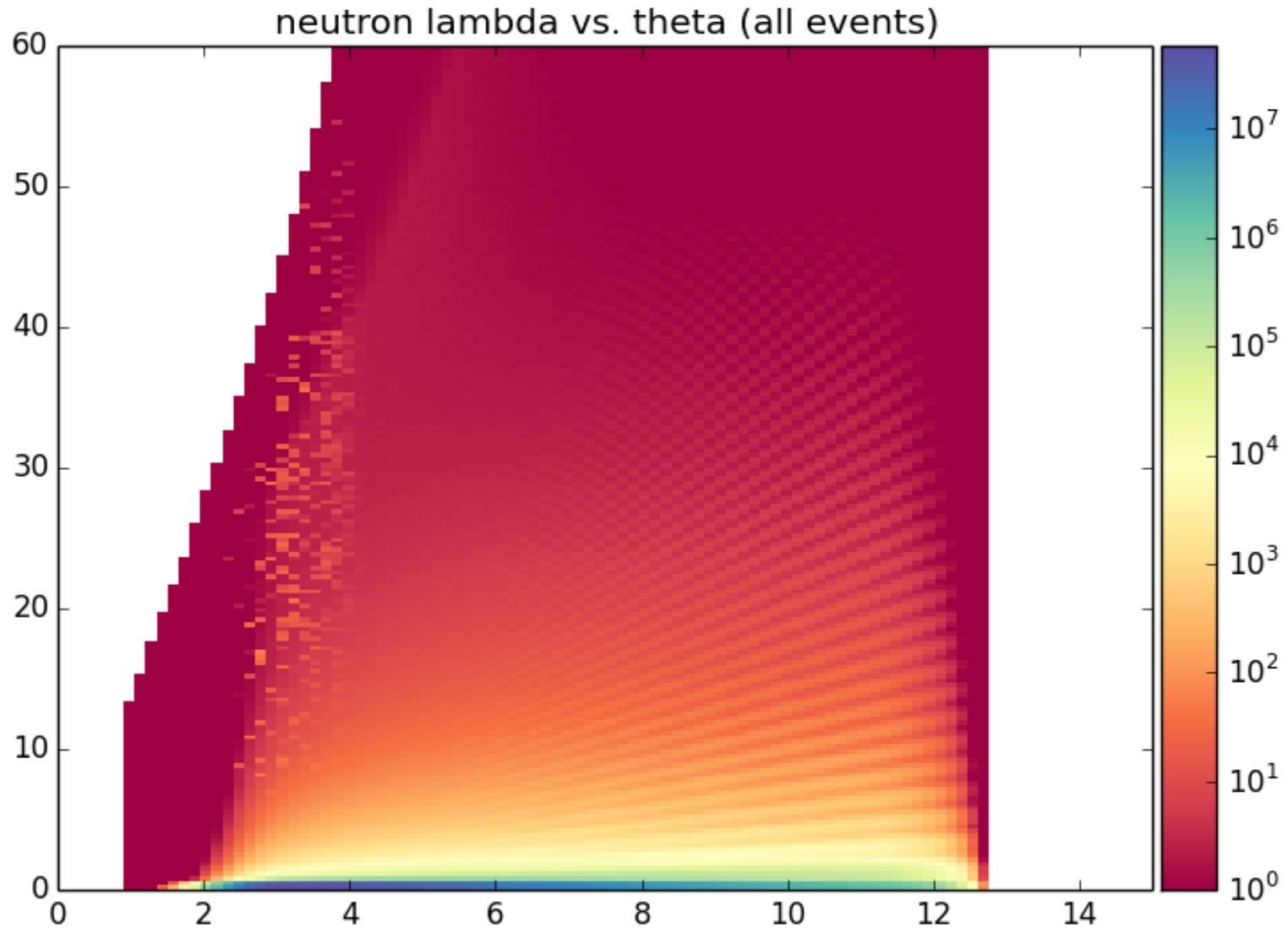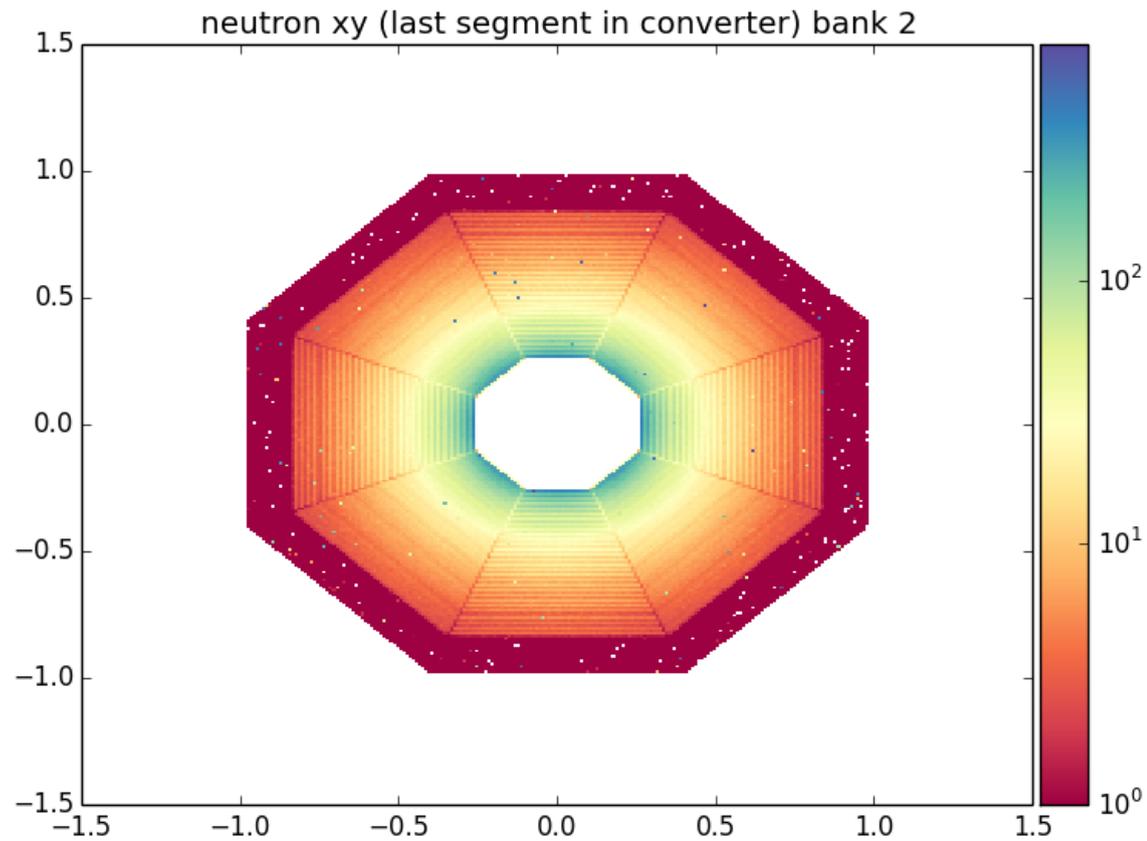
Kinetic energy distribution

Polar angle distribution of neutrons within the active detector area

geometrical acceptance

Converted neutrons xy in bank 1
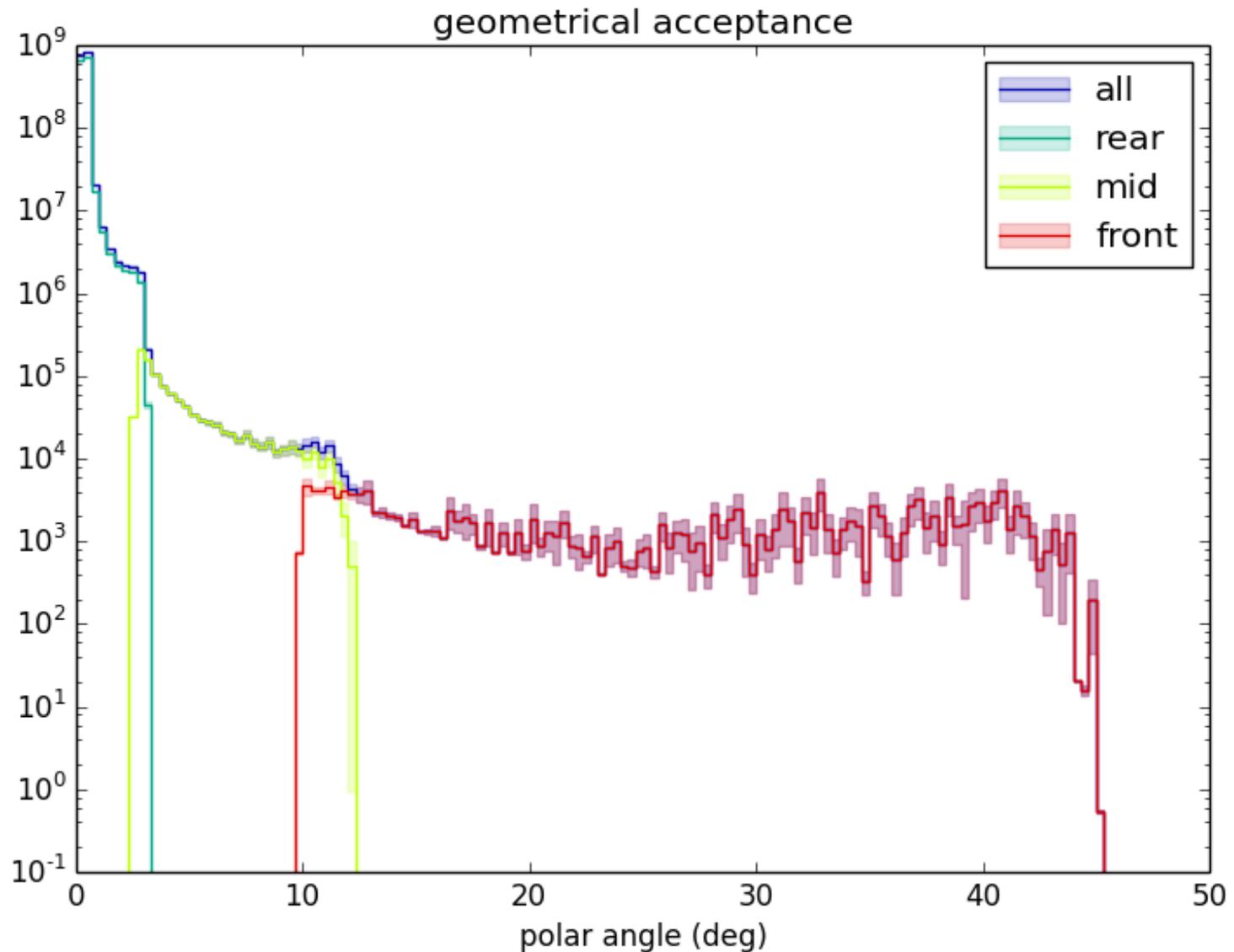
neutron xy (last segment in converter) bank 1

Converted neutrons xy in bank 2

neutron xy (last segment in converter) bank 2

Converted neutrons xy in bank 3

neutron xy (last segment in converter) bank 3
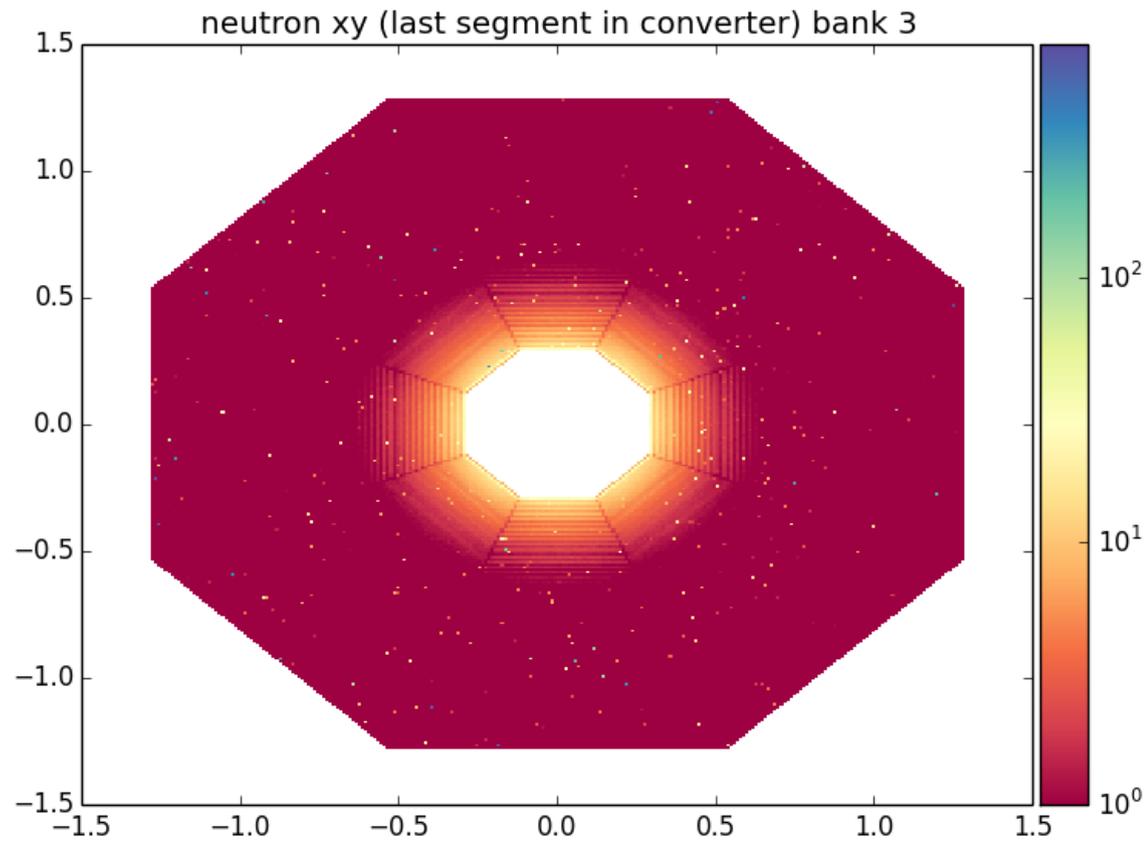
Efficiency for McStas input
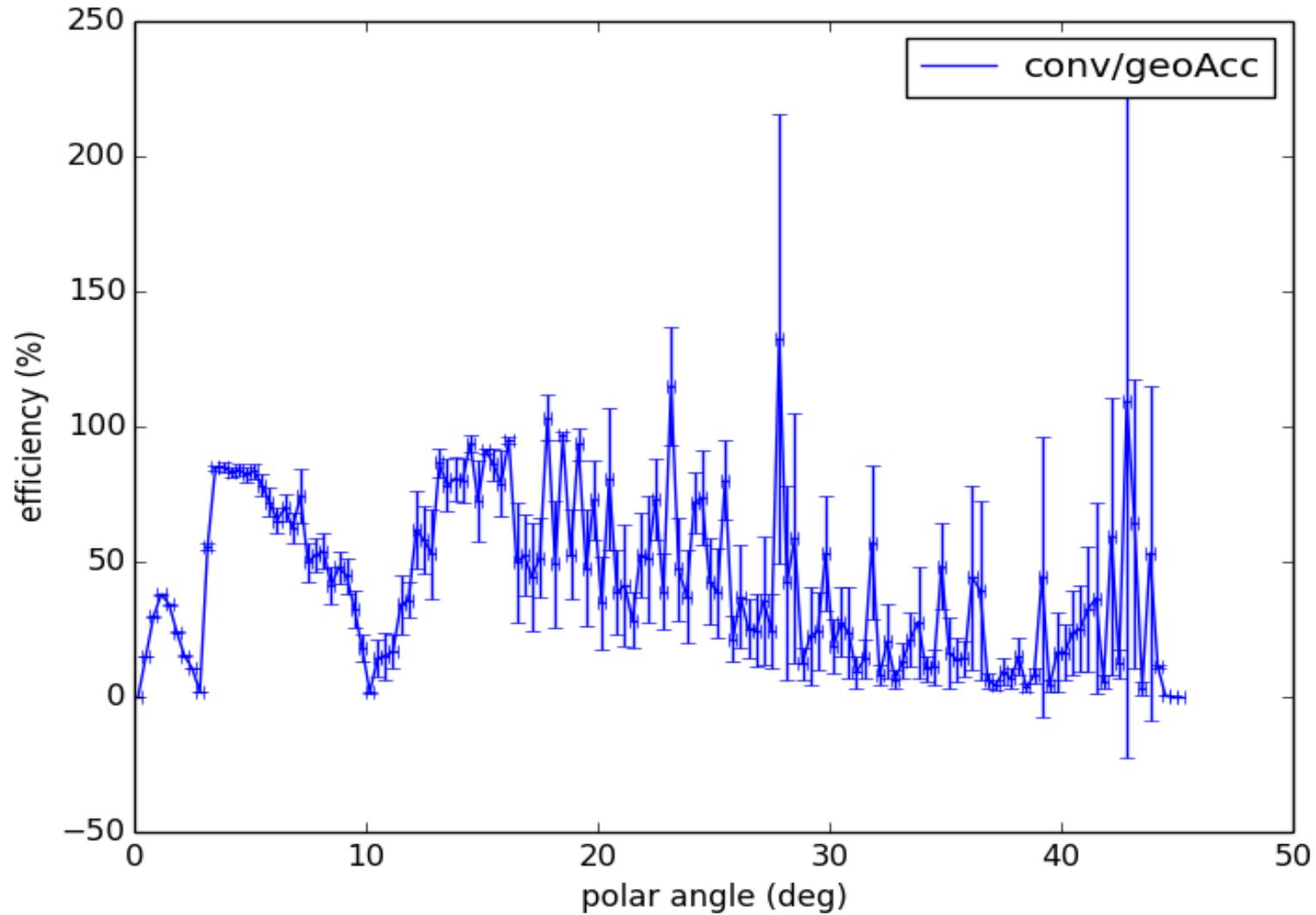
Converted neutrons Q

Theta migration

neutron true theta vs. conv direction

Phi migration

neutron true phi vs. converted
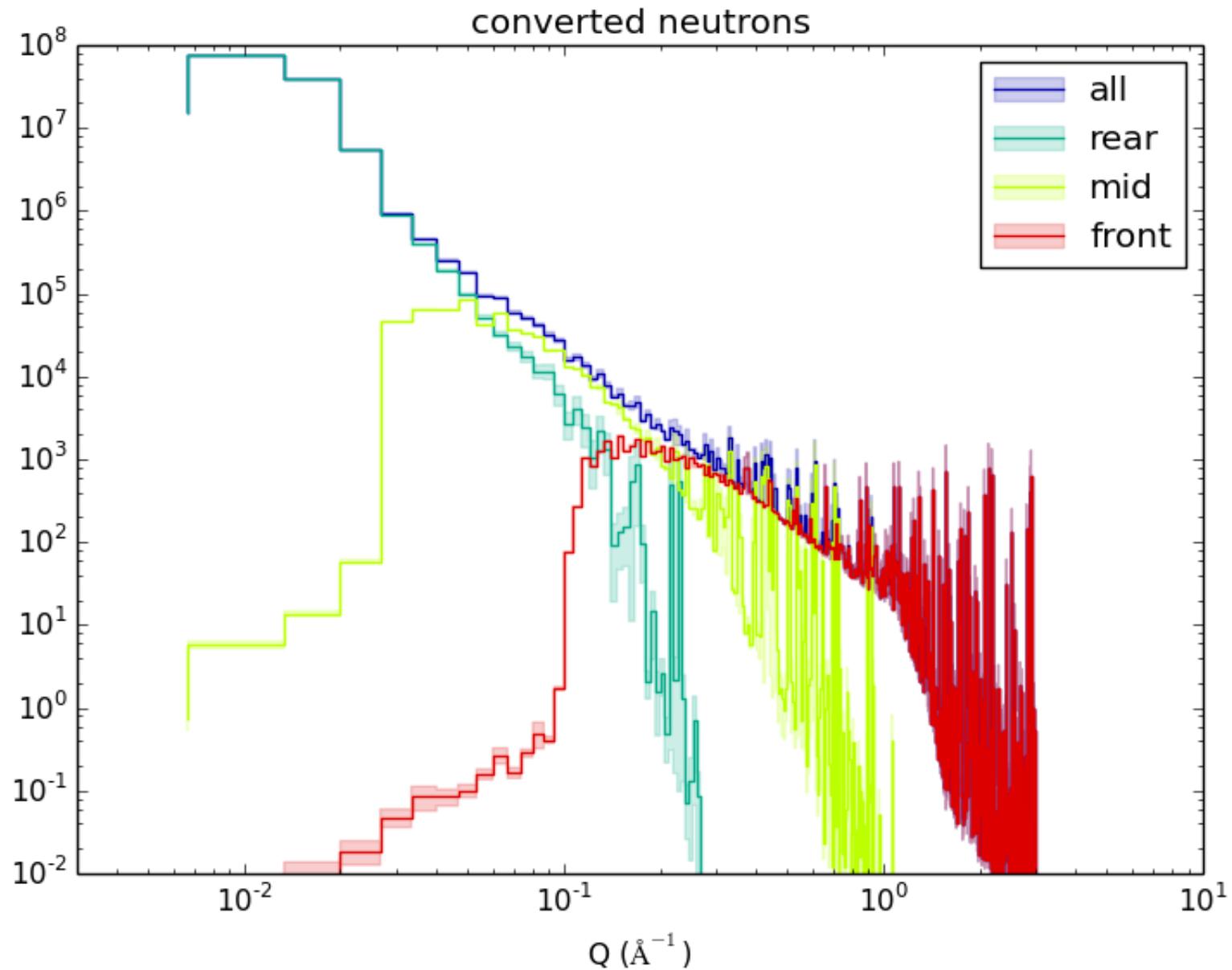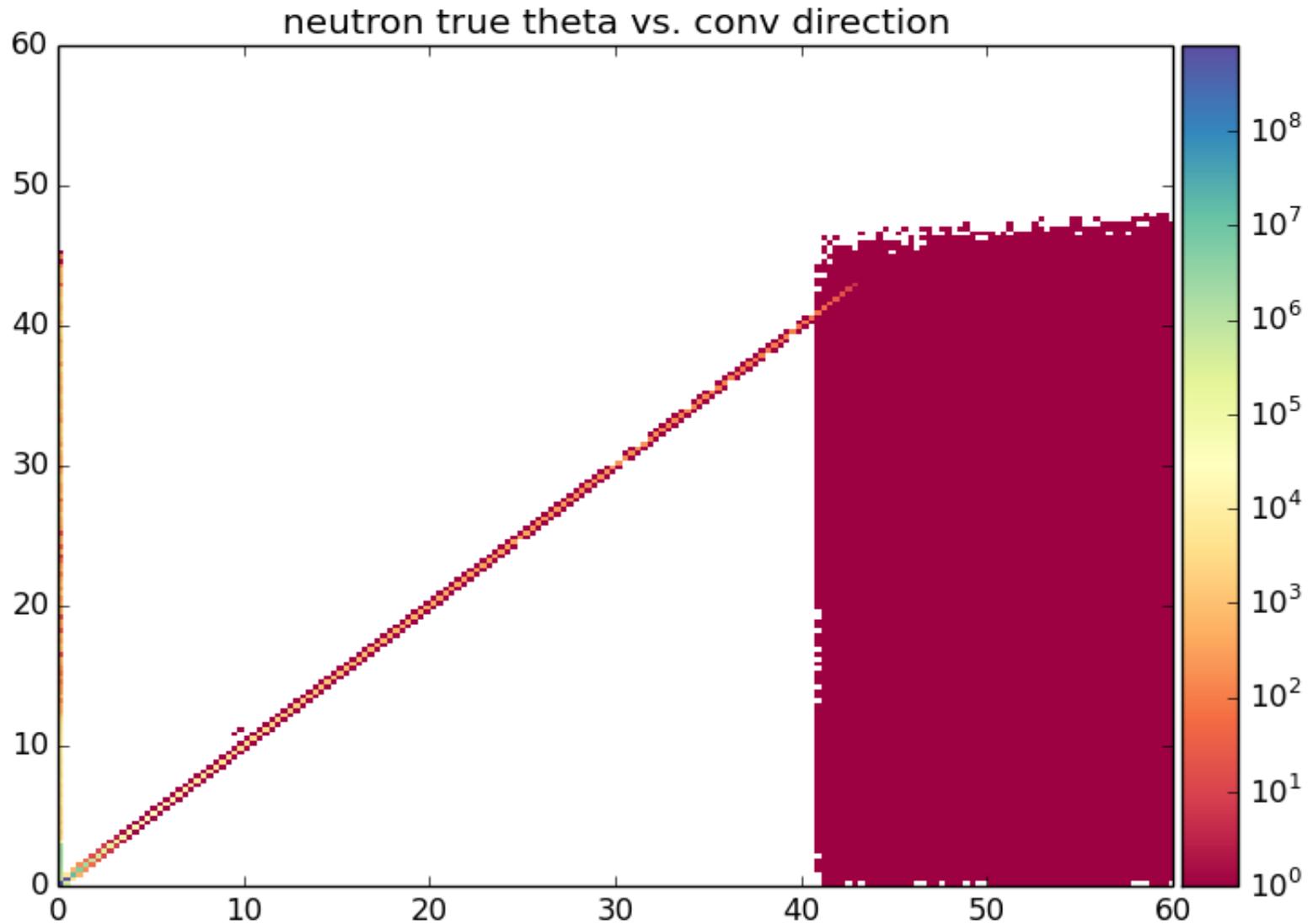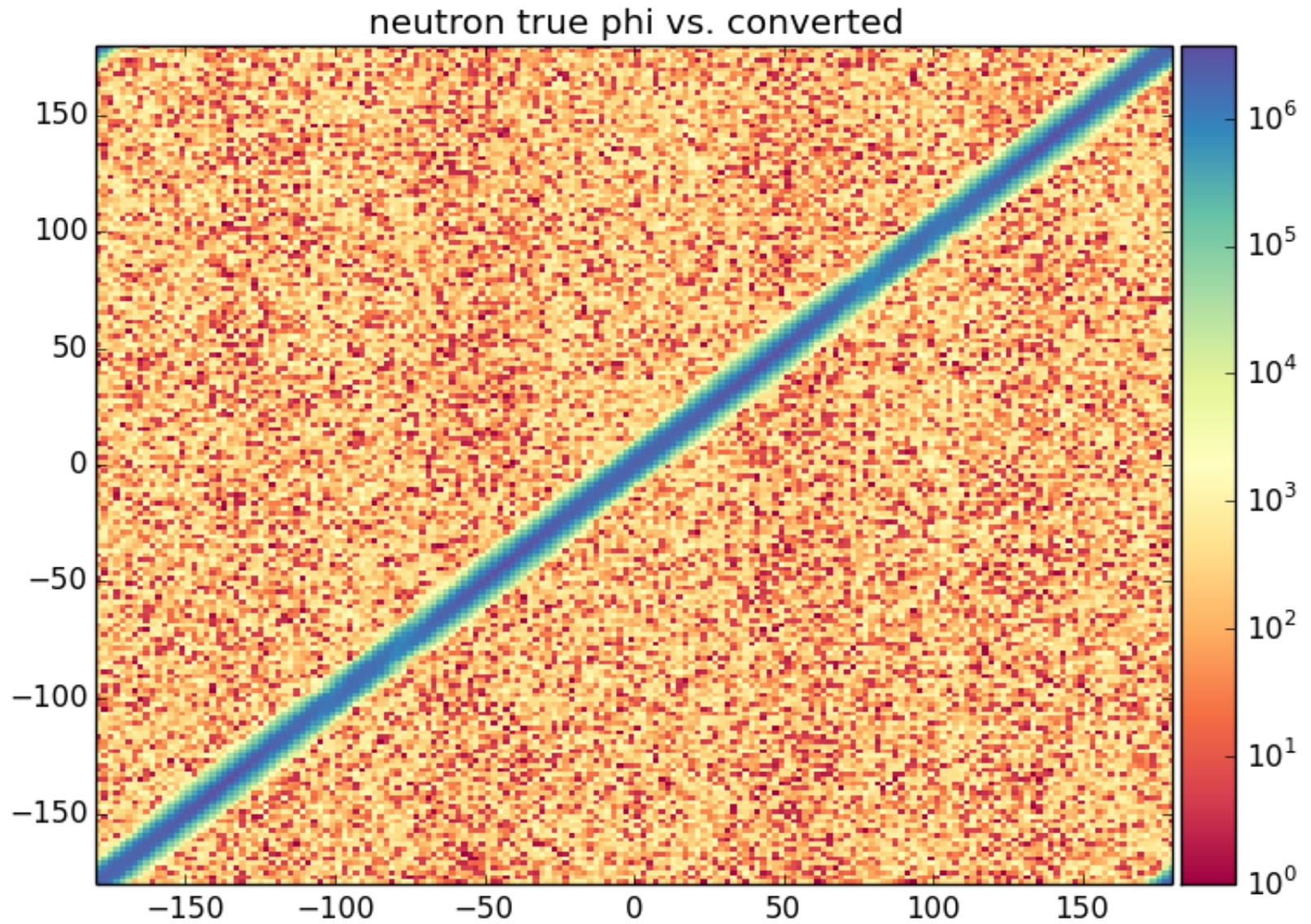
Next steps

- Various geometry modifications
- Scan of geometry parameters
- Scattering studies
- Spatial resolution studies
- Implementation of engineering details
- Implementation of low-angle detector geometry
- Study of various instrument configs and samples
- Beam monitor requirements
- Extend the analysis with Mantid routines