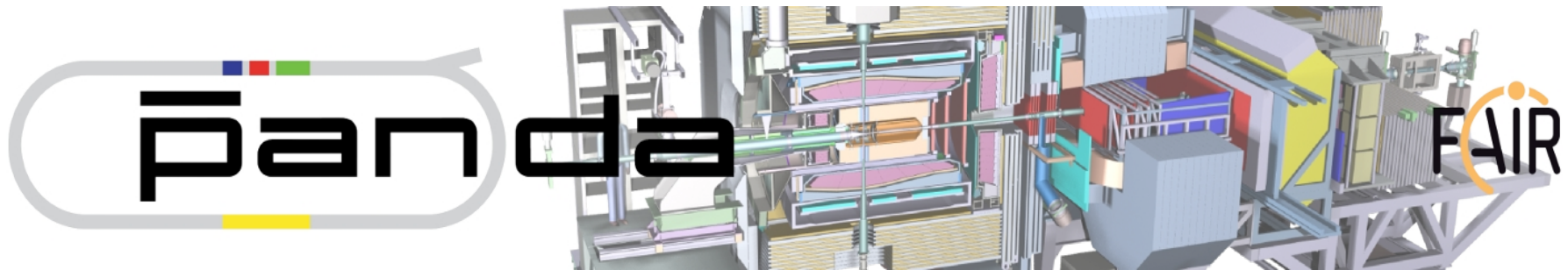


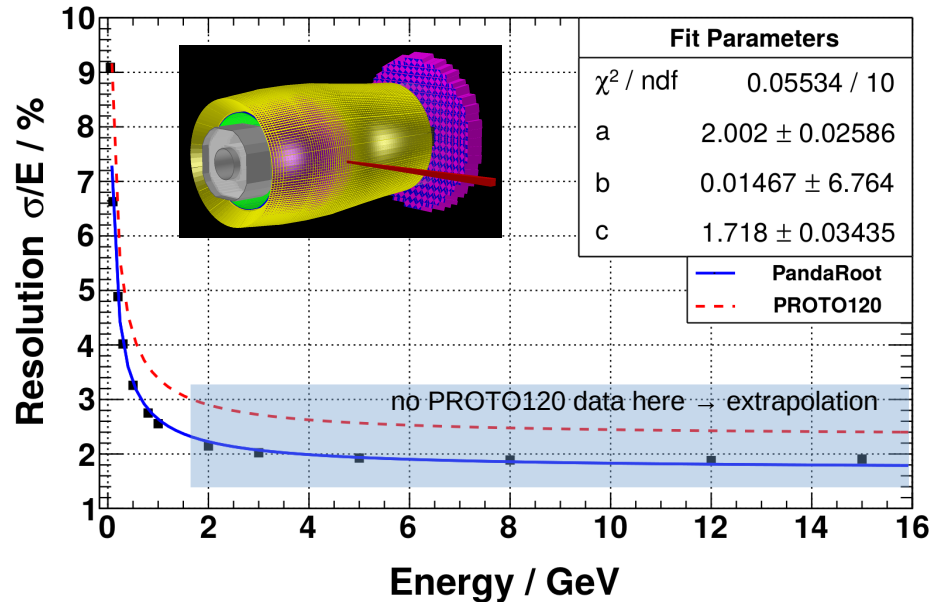
Response Improvement of the PandaRoot Calorimeter Model



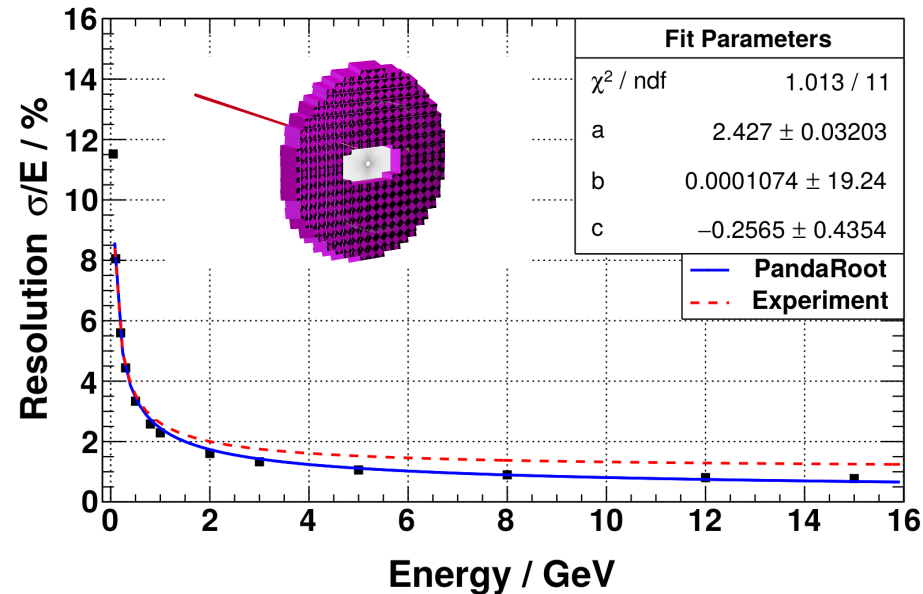
Markus Moritz, 2nd Physics Institute, JLU Giessen

PANDA CM, June 2019

Barrel



ForwardEndcap

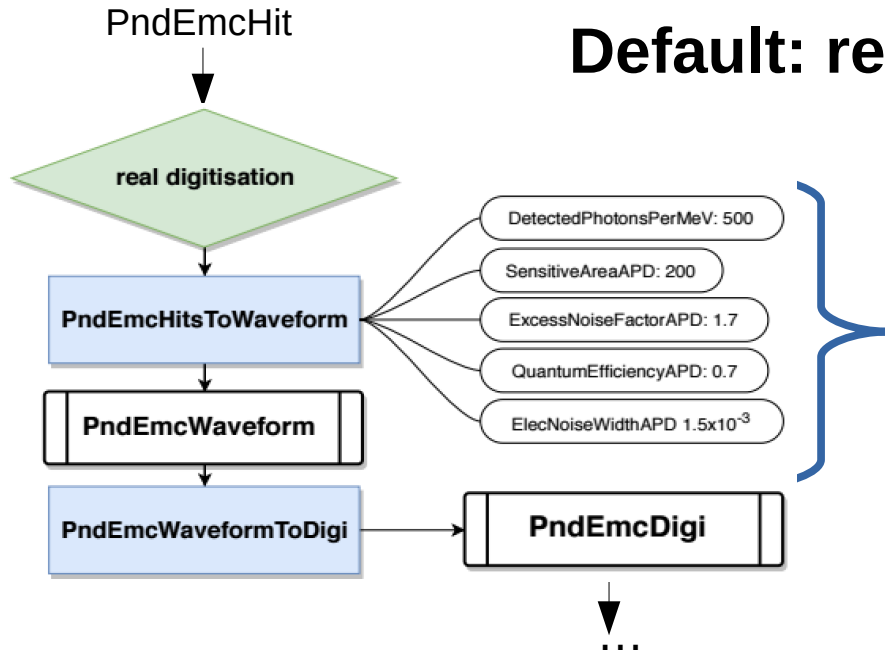


- PandaRoot release dec18p1
- Only EMC
- Particle gun into crystal front face center



PANDARoot dose not match experimental data

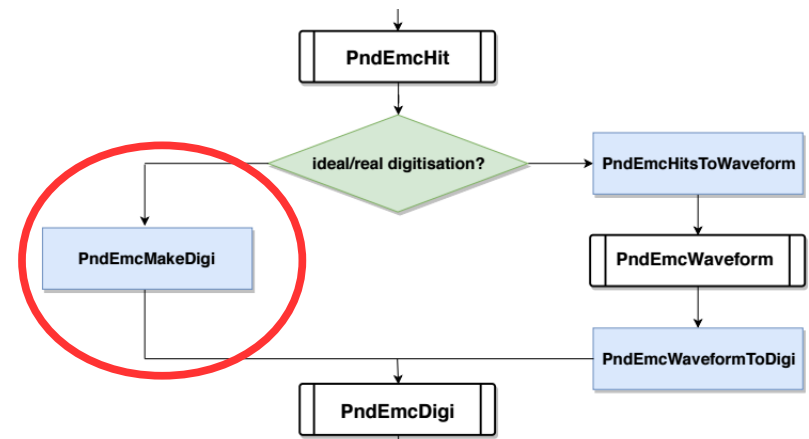
Default: real digitization model



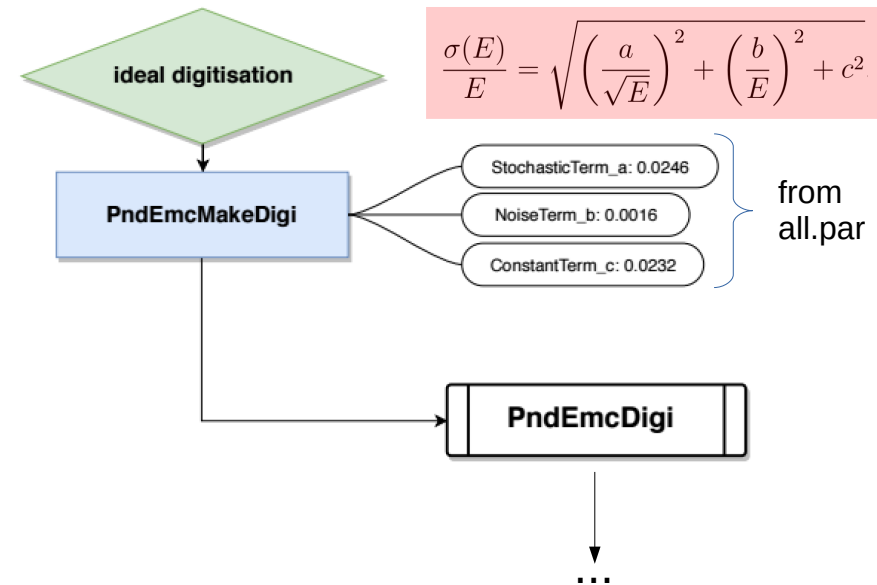
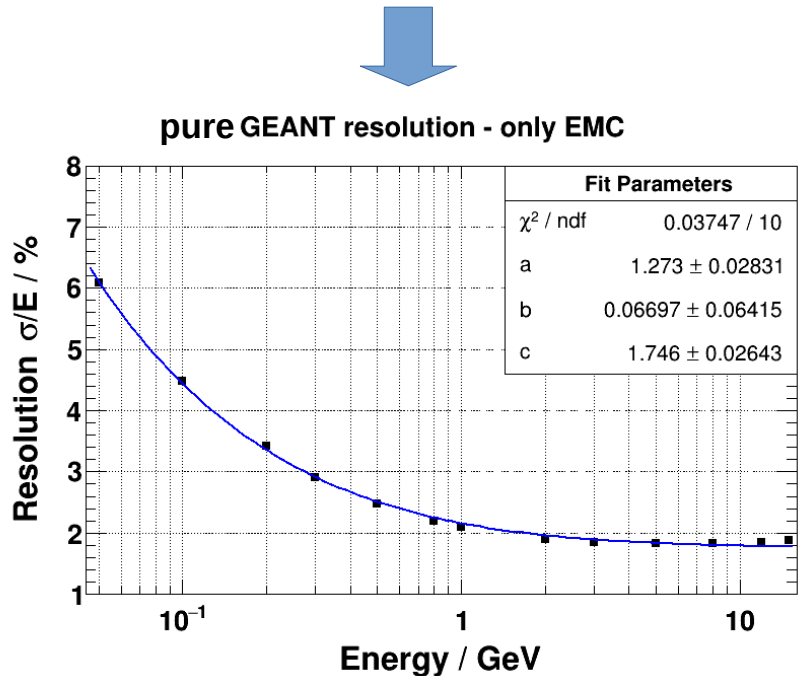
- Smearing happens in many steps
- All variables reasonable
- Vary within “error-bars” not sufficient to reproduce exp. data

Idea: ideal digitization model

- ➔
- Simplified Model
 - One smearing function to match experimental data

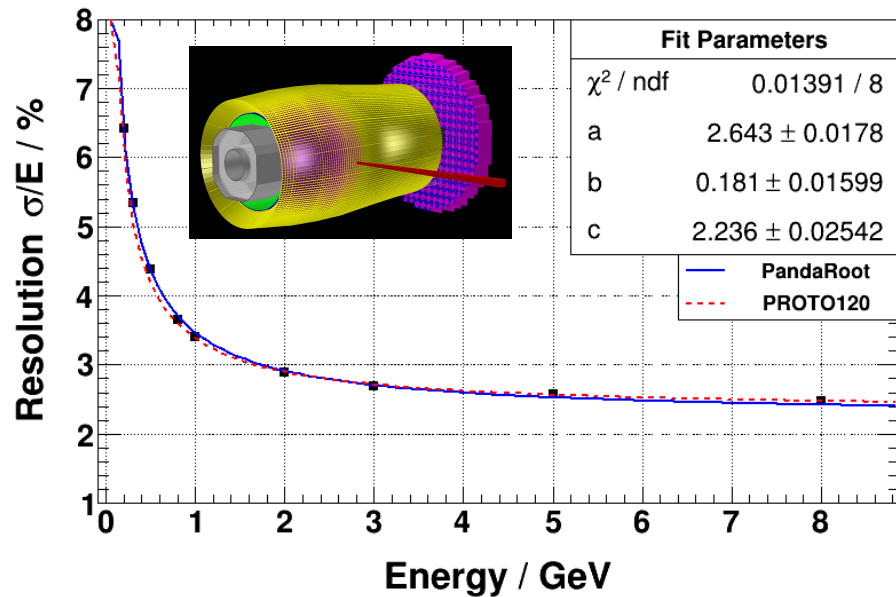


- Put experimental specified values (a,b,c) in all.par
- GEANT gives an geometry intrinsic resolution which has to be taken into account in digitization model
 - No other detectors in front for prototype experiment conditions

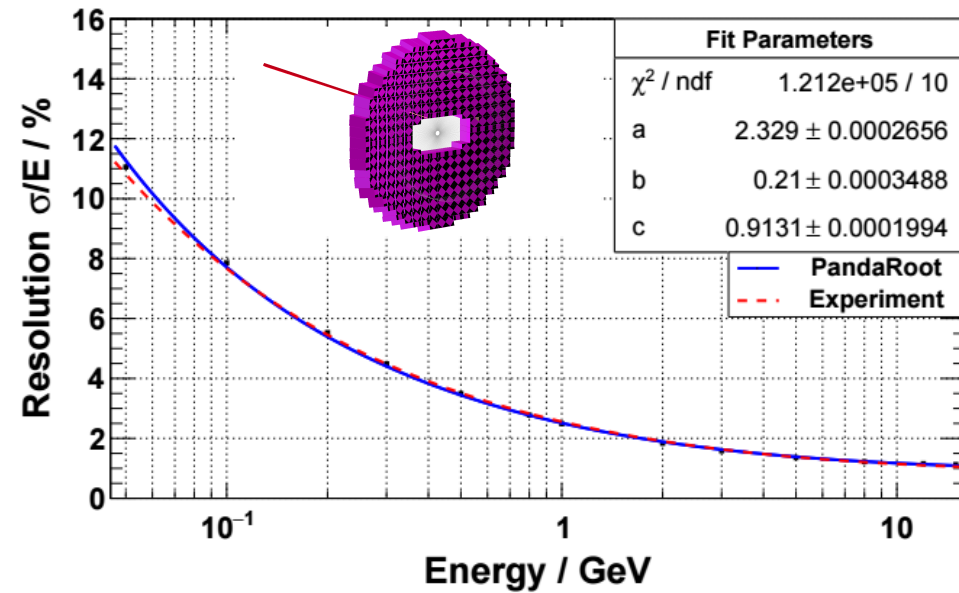


$$\left(\frac{\sigma}{E}\right)_{\text{digitisation}} = \sqrt{\left(\frac{\sigma}{E}\right)_{\text{PROTO120}}^2 - \left(\frac{\sigma}{E}\right)_{\text{GEANT}}^2}$$

Barrel



FWEndcap



No other detectors in front

- PANDARoot does not reproduce experimental energy resolution of EMC Prototypes
- Current digitization model includes a lot of parameters for smearing
 - Adjusting those within certain tolerances not sufficient
- Very simplified (ideal) digitization model reproduces experimental data via $\left(\frac{\sigma}{E}\right)_{EMCSIM} = \sqrt{\left(\frac{\sigma}{E}\right)_{PROTOTYPE}^2 - \left(\frac{\sigma}{E}\right)_{GEANT}^2}$
- For time-based simulations not (yet) applicable
- Current proposal: make both digi models parallel available

**Thank you
for
your attention**

Acknowledgments:
Maximilian Rokuss

FWEndcap

- Trouble determining the intrinsic GEANT resolution
- Especially the lower energies not reasonable fitable
- 50 MeV photons:
 - Sharp peak at 50 MeV for photons with a multiplicity of 1
 - shower containment only in one crystal (?)
- Problem did not occur in barrel because of implemented *non linearity light collection*
- Approach to fix this was simulating with a pre smearing which was later subtracted

