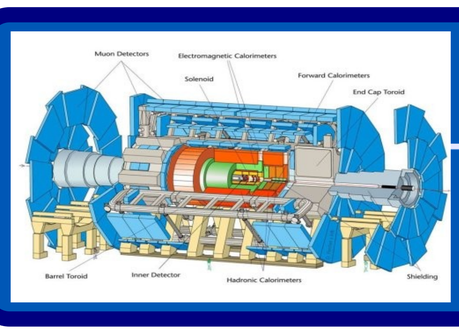
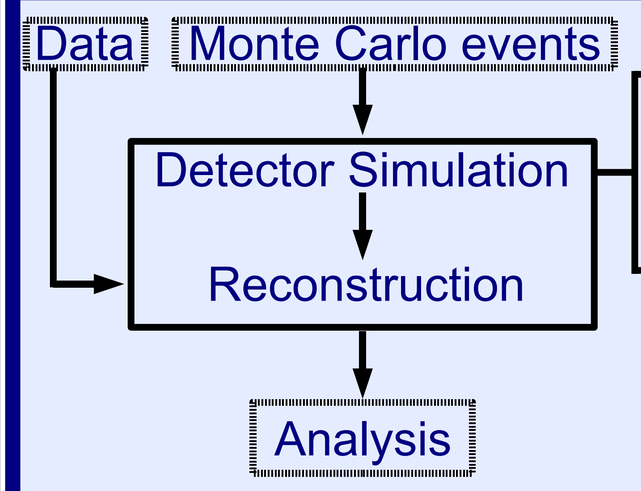



# Tuning of ATLFAST II to data

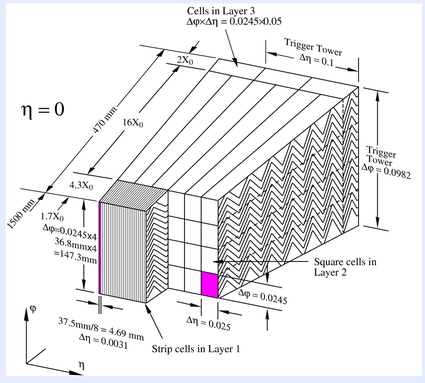
Evelyn Schmidt
ATLAS-Experiment
University of Freiburg

## ATLFAST II




**Full simulation**
(very accurate but slow)

**ATLFAST II**
(fast but approximative)



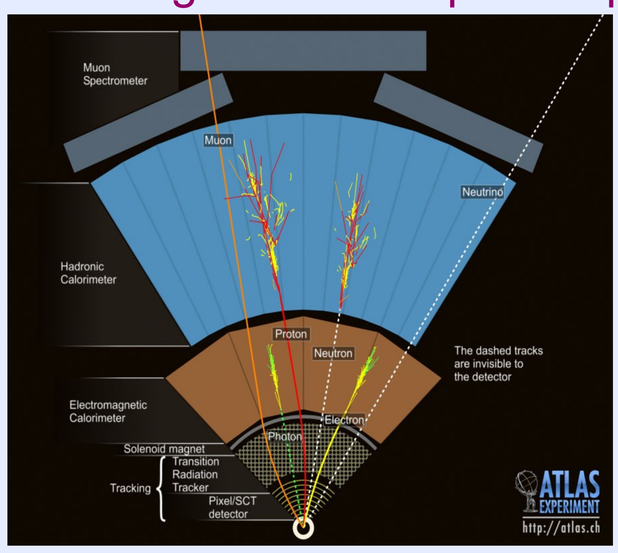

**ATLFAST II :**

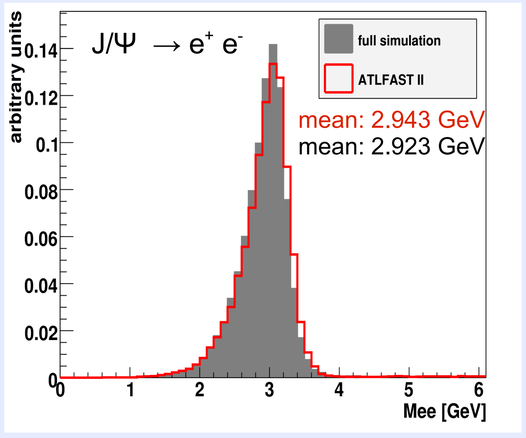
fast calorimeter simulation based on parametrization of **energy response, resolution** and **average lateral shower shape** of single particles:
- **photons** (used for electrons and photons)
- **charged pions** (used for all hadrons)

Differences between simulation and data are expected and have to be adjusted

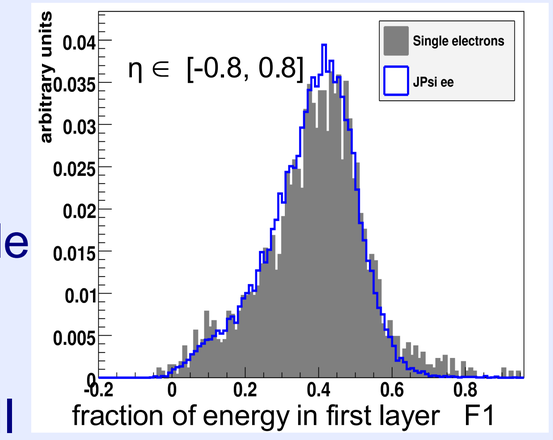
## Comparing full simulation and AFII

$J/\Psi \rightarrow e^+e^-$ and $Z \rightarrow e^+e^-$ are possible channels for tuning of electron/photon parametrization

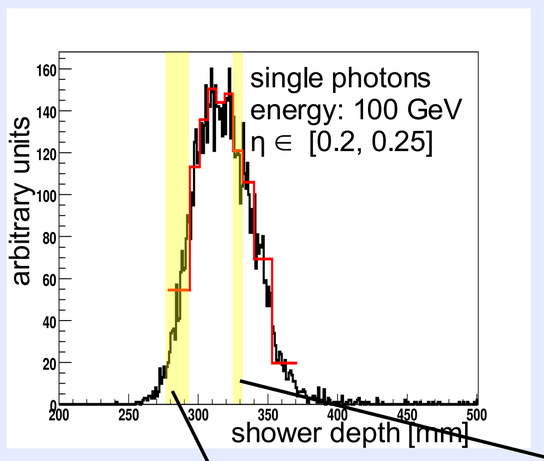


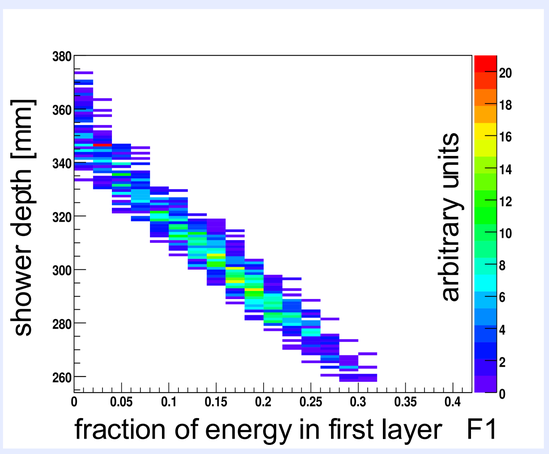



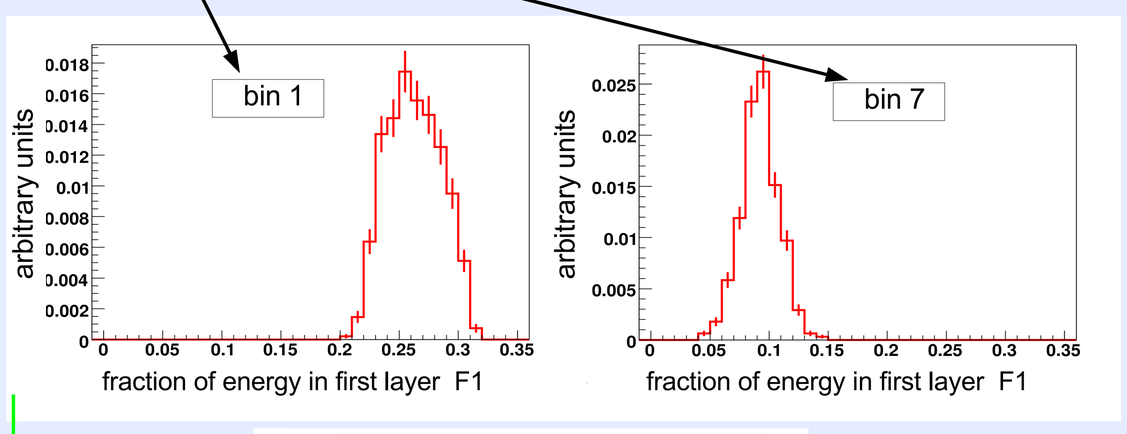

- "tag and probe" method to select electrons for tuning
- Similar F1 distribution of single electrons and $J/\Psi \rightarrow e^+ e^-$
- Possible to learn from probe electrons how to tune Atlfast II



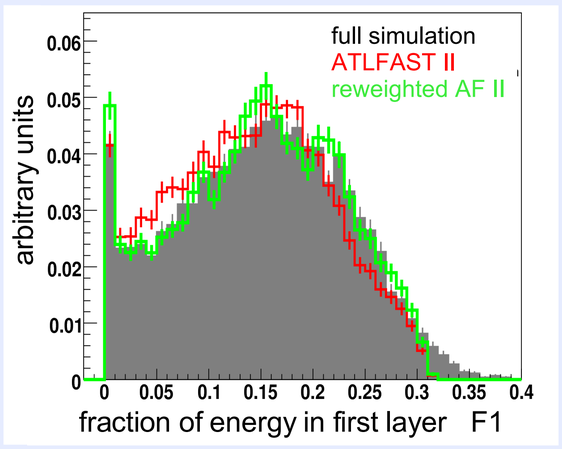

## Tuning




reweight bin X probability




**Aim:** Tuning of fast simulation to data

- Possible because parametrization is based on measurable quantities (e.g. shower depth)
- Large amount of photons and electrons will be reconstructed in early data

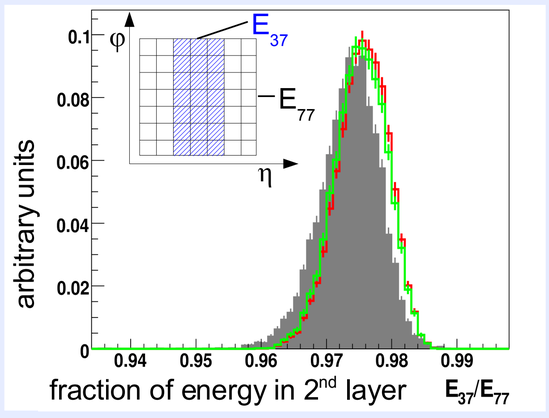
**Preparation:** Tuning of fast simulation to full simulation using single photons

**Ansatz:**

- Shower depth $d = 1/E \sum E_i \times d_i$ is internal parameter of fast simulation
- Strong anticorrelation of shower depth and fraction of energy in first layer ( F1)
- Experimental measurable F1 distribution useable to evaluate necessary changes of shower depth
- Determine weights depending on shower depth of photons
- Apply weights to bin probability
  ➔ better agreement

## Outlook

- Corrections for broader η-regions and further energies
- Investigation of shower shape corrections
- Use $J/\Psi \rightarrow e^+e^-$, $Z \rightarrow e^+e^-$ and $Z \rightarrow \tau^+\tau^-$ to select electrons and τ-leptons (pions) in early data




## Publications

**ATLAS Internal Notes :**

- Benchmark test of ATLFAST II ( in preparation)
- Validation of the fast calorimeter Simulation FastCaloSim (ATL-PHYS-INT-2009-073)

**Publication:**

- The ATLAS Monte Carlo Simulation (ATL-COM-SOFT-2008-024, JINST in preparation)