Novel Powering Schemes for the CMS Tracker at the Super-LHC
Katja Klein, HGF Detector Fellow, RWTH Aachen University
with L. Feld, R. Jussen, W. Karpinski, J. Merz, J. Sammet

The power distribution problem of the CMS tracker at the Super-LHC

- Partner: L. Feld, R. Jussen, W. Karpinski, J. Merz, J. Sammet

The CMS Tracker and its power distribution

- Simulation of Tracker MB within CMS software (KGSIS), based on CAPE
  - One Aachen Standard C converter per MB module, located on the front and hybrid
  - Assumptions: conversion ratio = 8, efficiency = 80%
  - Copper rating in cables and motherboards evaluated based on tolerable voltage drops & power losses

Aachen DC-DC buck converter

- Development of converters with commercial radiation hard buck converter ASICs
- Focus on low mass, low noise converter design, and study noise behaviour and integration aspects

Measurement of converter noise spectra

- Comparison of MB of all MB with AC2, DC2, and DC converters
  - 50% reduction in switching noise at edge channels

System test measurements

- New readout ASICs and module prototypes not yet available
- Data can already be obtained from the operation of current tracker hardware with DC-DC converters

Next steps

- Continue studies of noise coupling mechanisms
- Development of DC-DC converters using radiation hard ASICs
- System tests with SLHC readout chips and prototypes modules
- Converter integration aspects: cooling, spa, shielding etc.