

Dielectron Simulations for the CBM-TRD

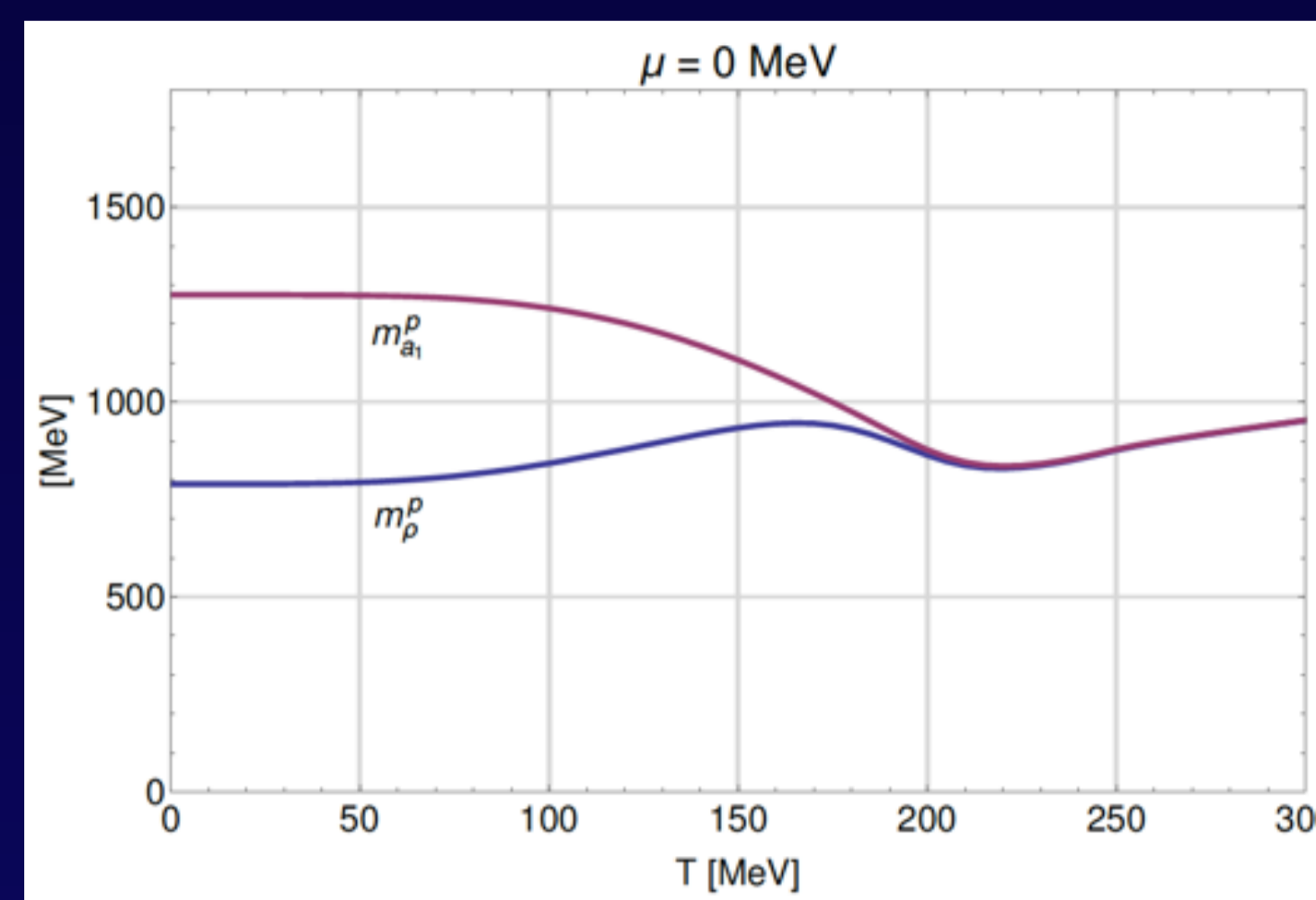
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Motivation

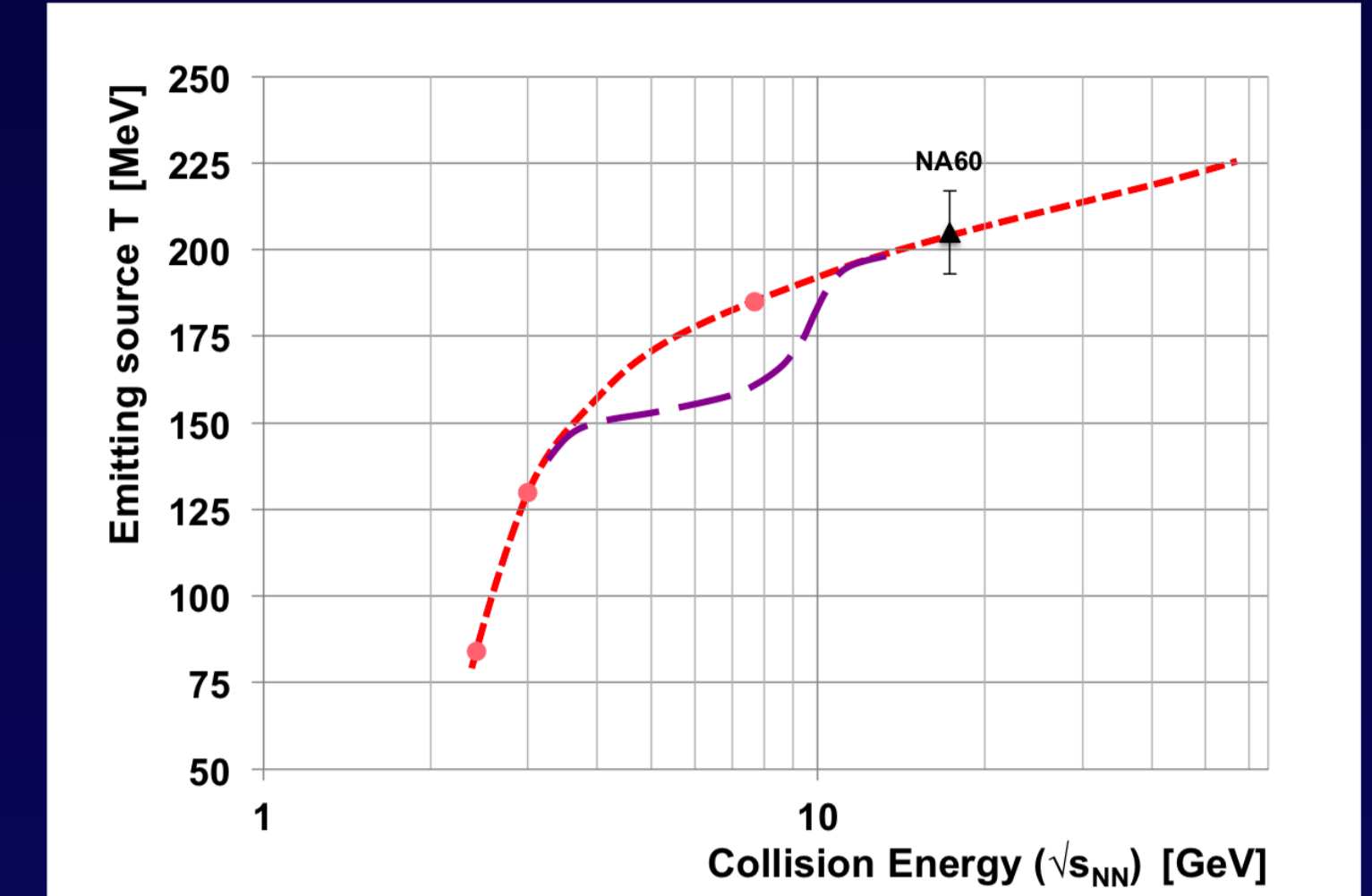
- In nature chiral symmetry is spontaneously broken
 - A measurement of its restoration would be a breakthrough
 - Manifests in mixing of chiral pairs
 - Dileptons give direct access to the chiral mixing
- Is there a first order phase transition?
 - No measurements in the respective energy regime
 - Dielectrons can be used as thermometer of the emitting source
 - They can also be used as chronometer and barometer
 - They carry information about the early phases of the fireball

Chiral mixing



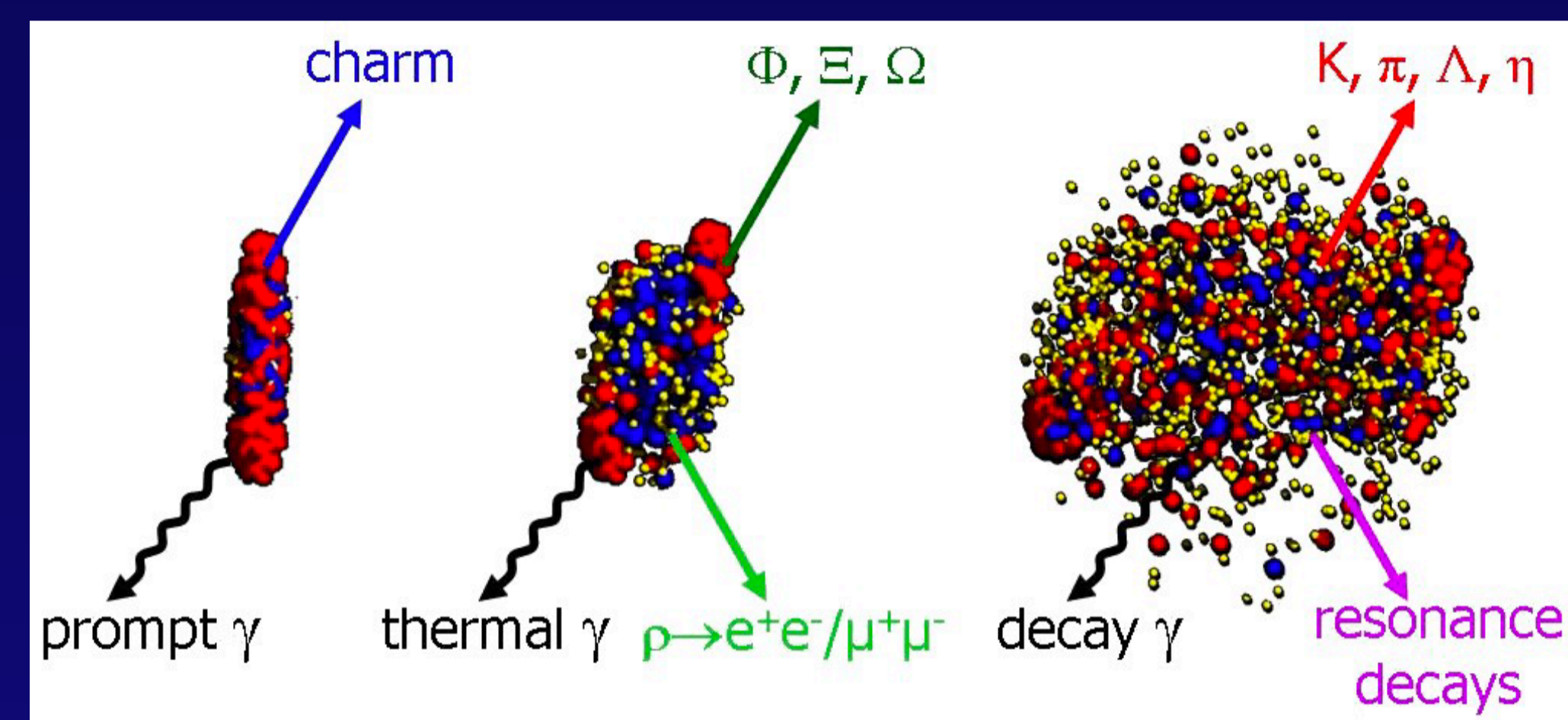
*Phys. Lett B731 (2014)

Possible phase transition



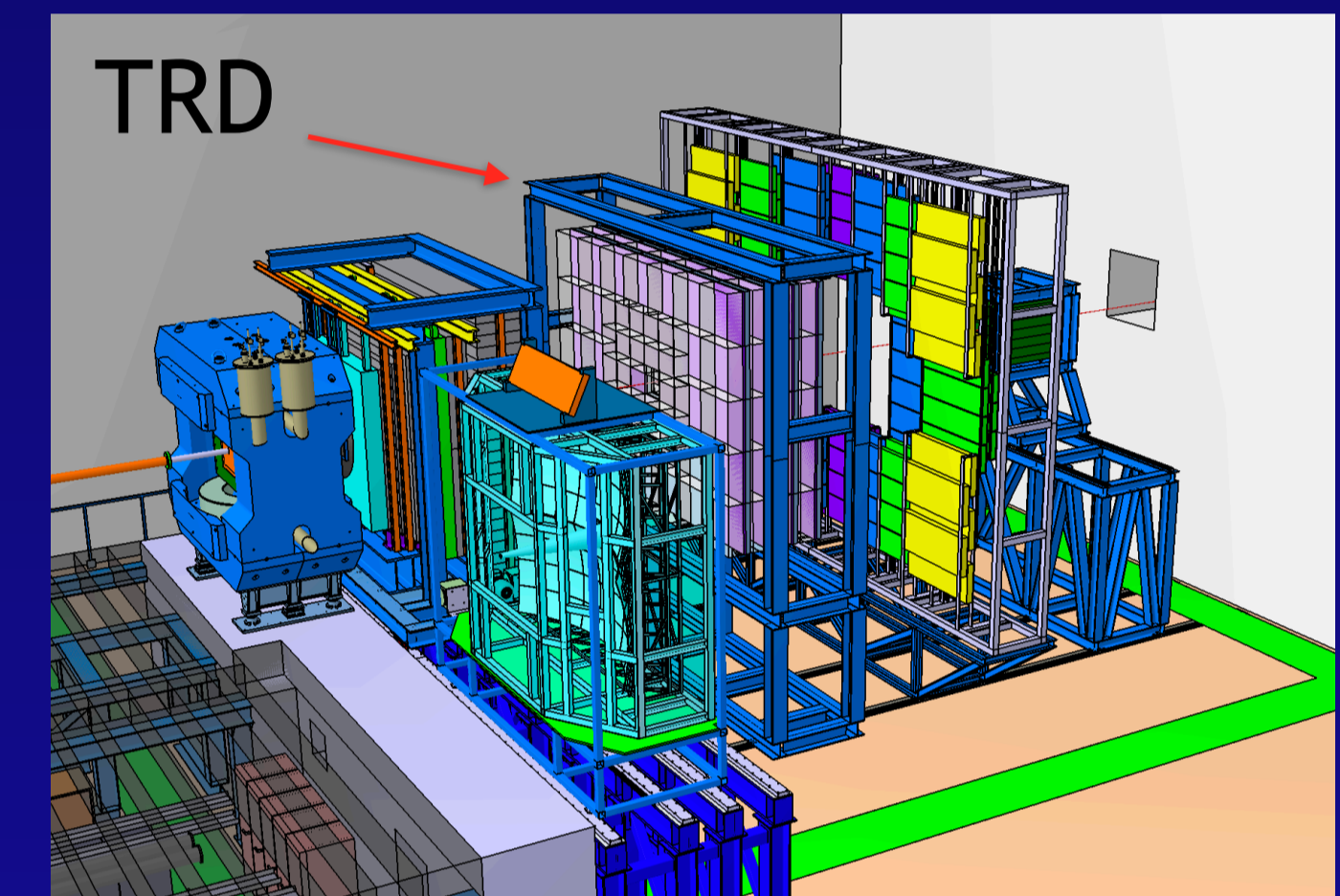
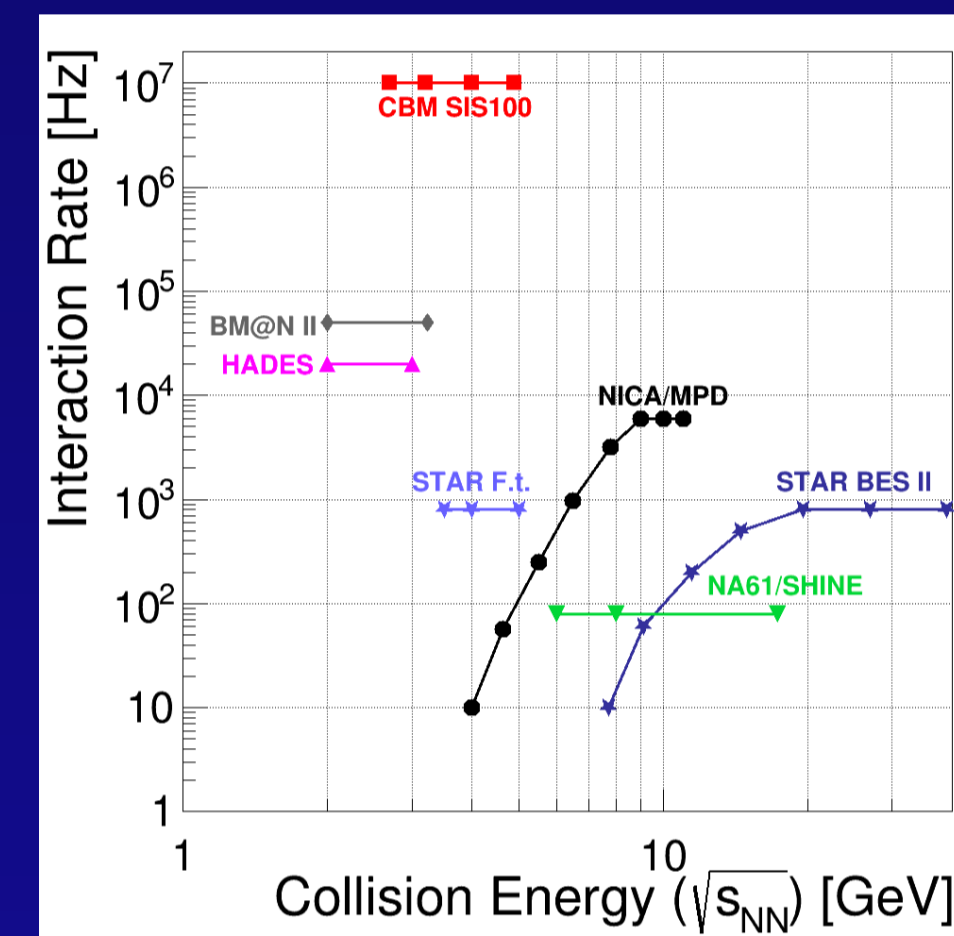
*arXiv: 1607.01487

Fireball development in a heavy ion collision



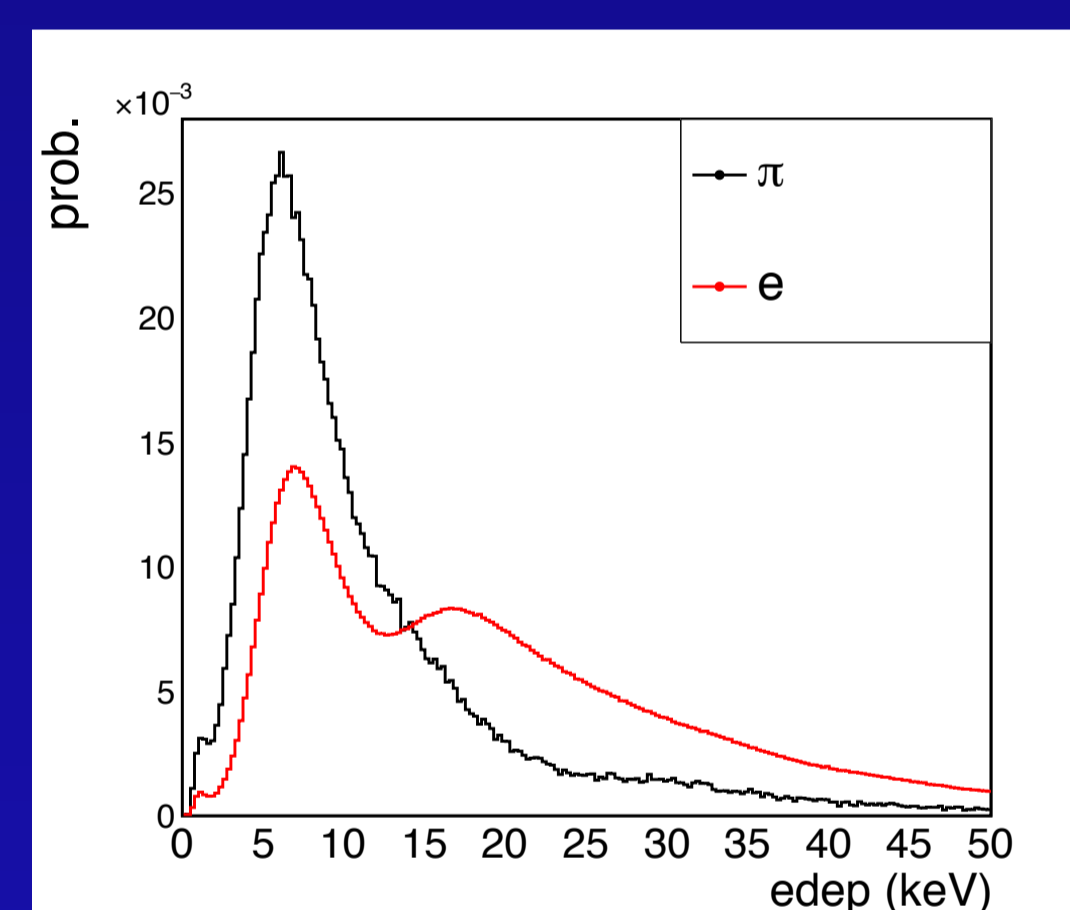
The CBM experiment

- Unmatched interaction rates at moderate energies
 - Investigation of rare processes
- Interchangeable detector configurations
 - Specified for electron / muon / hadron measurements

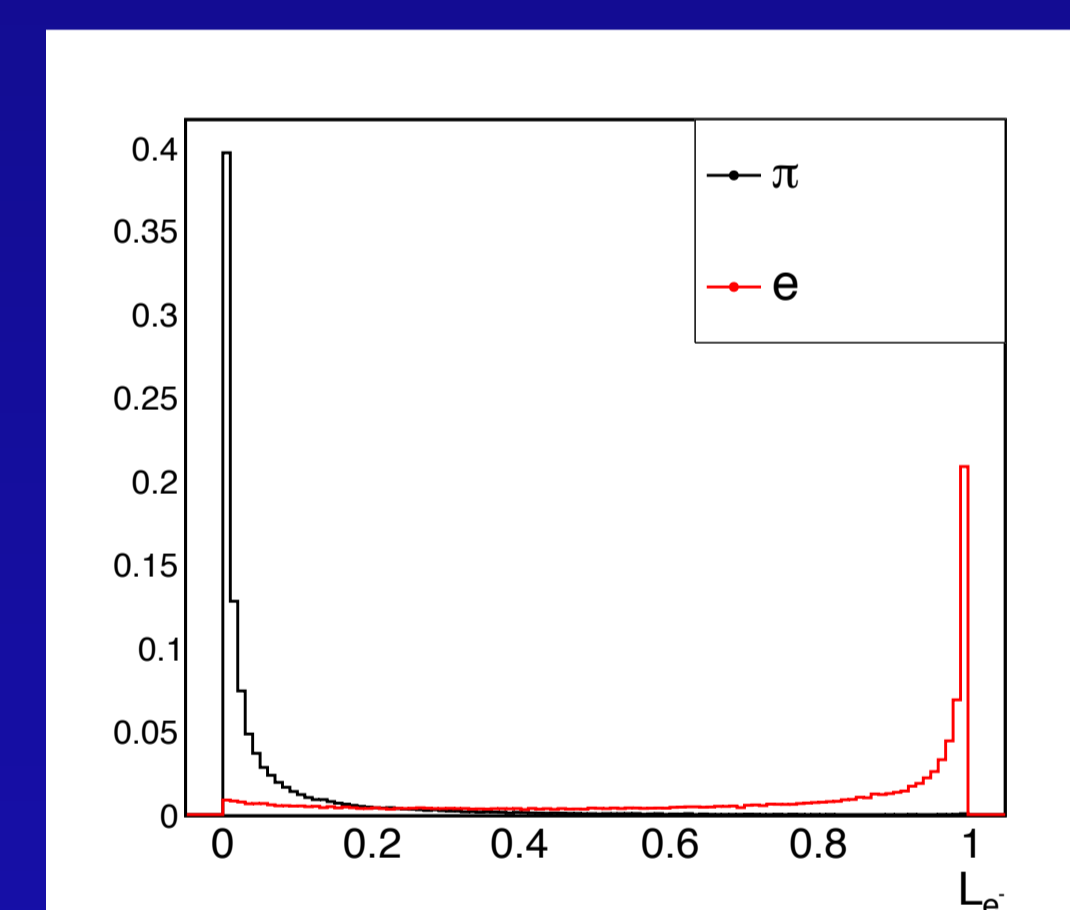


Electron identification with the TRD

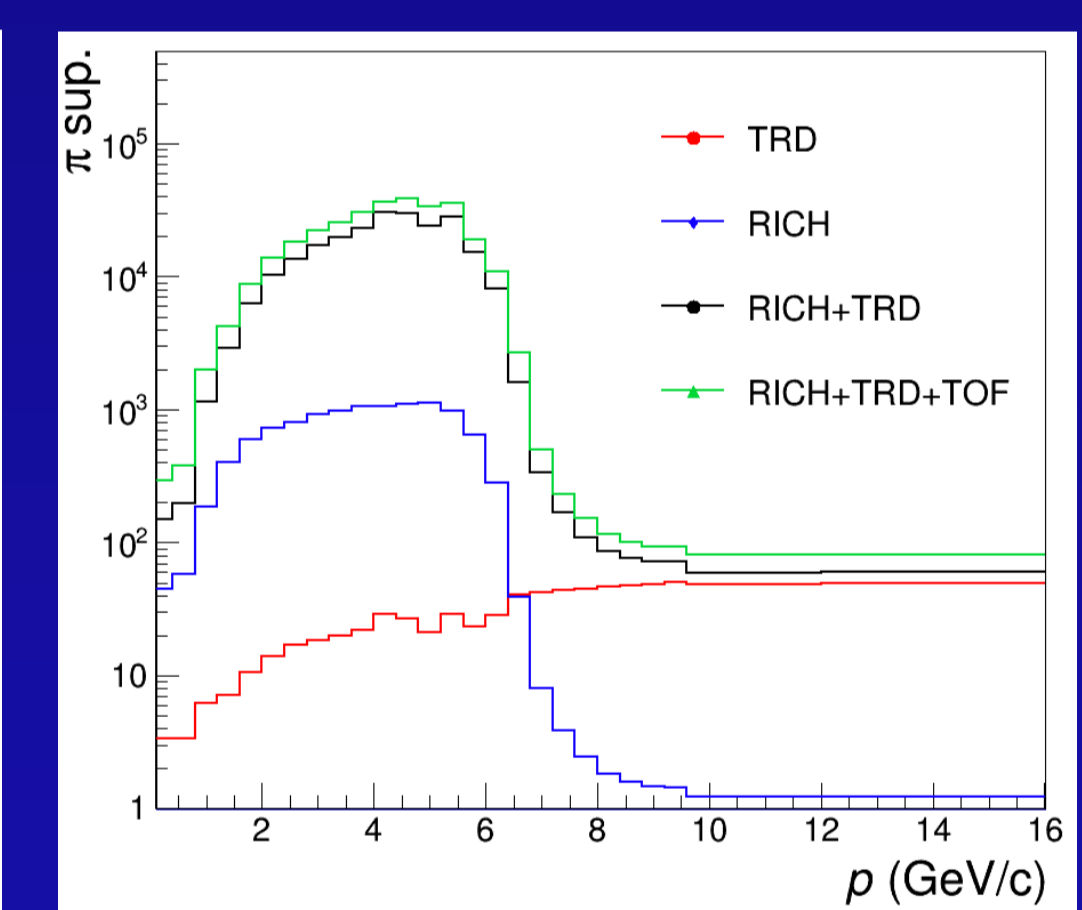
- Dielectron channels have very low cross sections
 - There are large hadronic contributions
 - A good pion suppression is needed
- The RICH detector does not provide electron ID at high momenta
- The electron ID of the TRD increases while the RICH reaches his limits



Energy deposition in the TRD



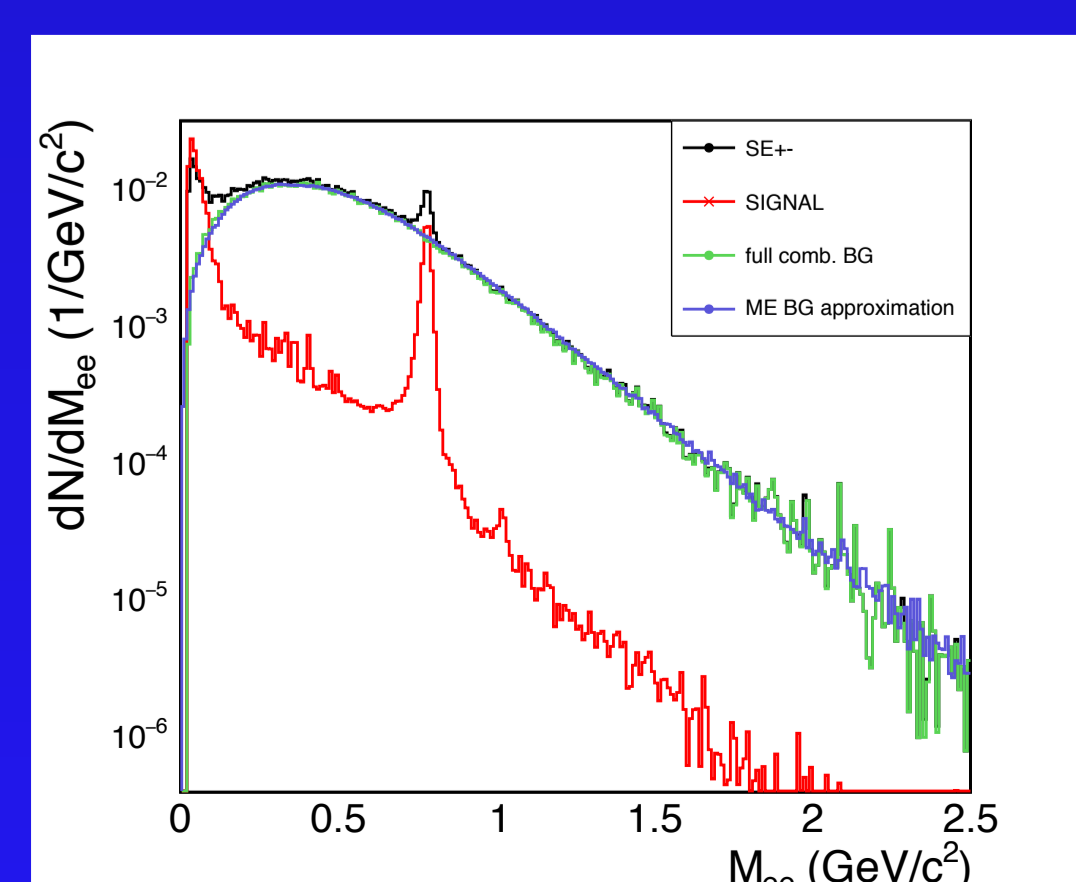
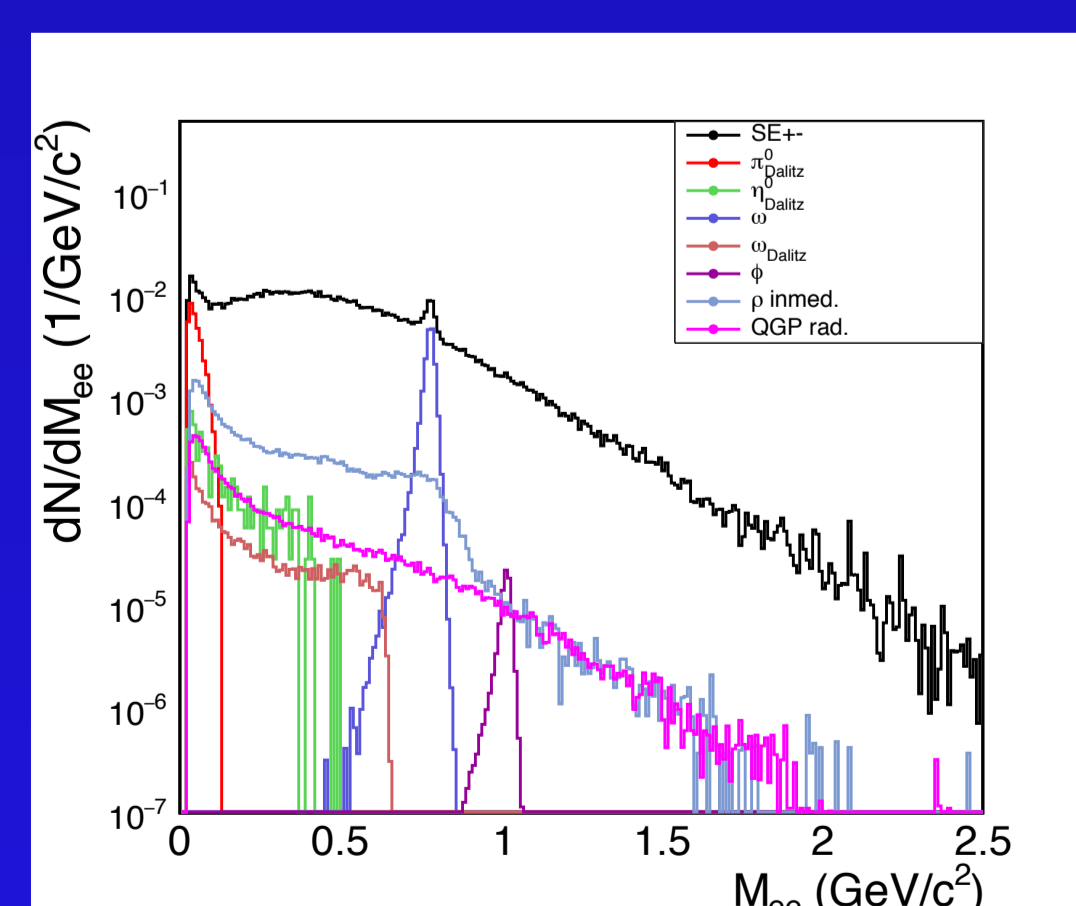
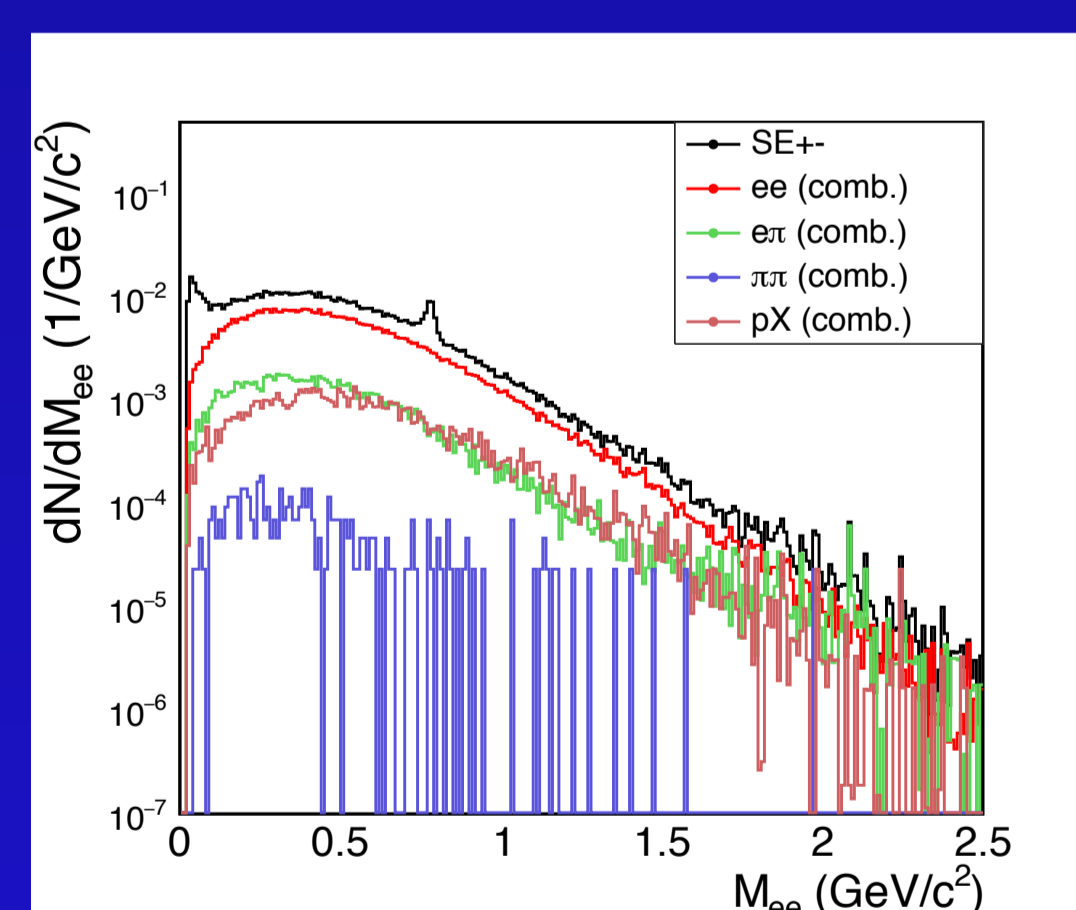
Electron ID with the TRD



Pion suppression

8 A GeV 10% most centr. Au+Au collisions

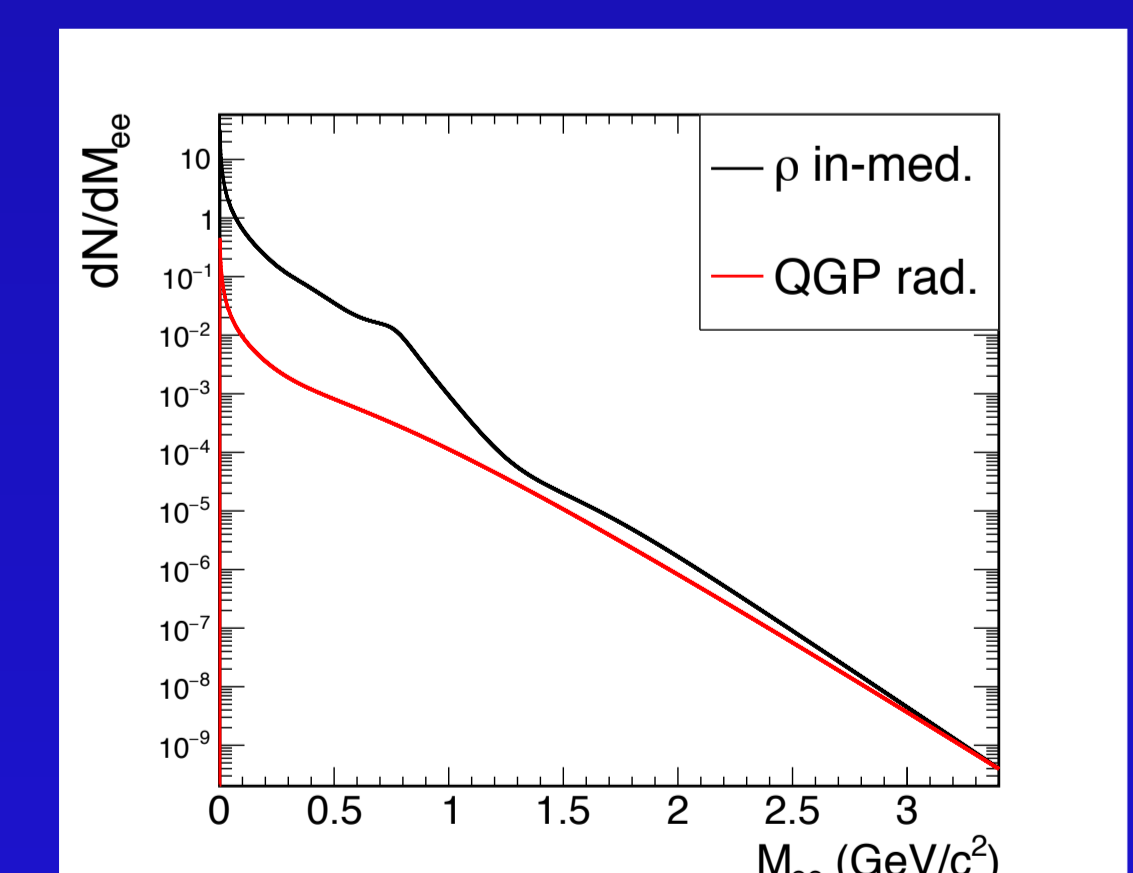
- Combinatorial dielectrons are the dominant background contribution
 - Pion suppression is sufficient in the whole invariant mass range
- Clear peaks for the low mass vector mesons
- Thermal radiation is the only signal source above 1 GeV
- Good background description with event mixing technique
 - Access to the thermal signal



12 A GeV Au+Au outlook

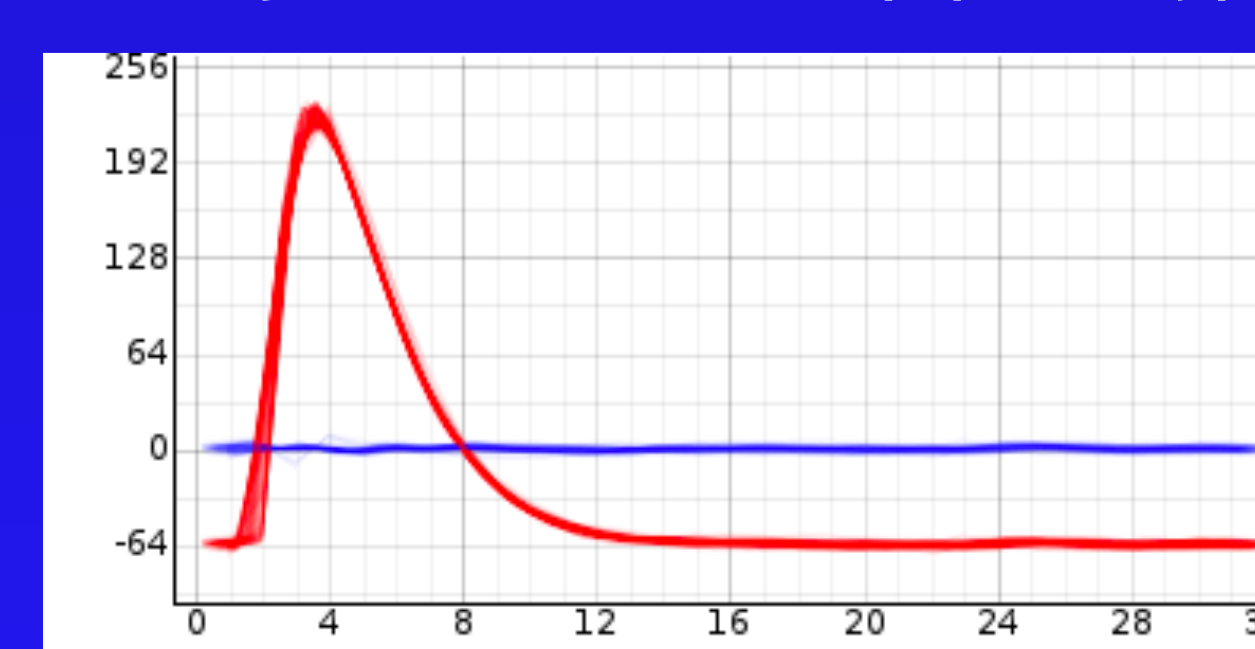
- New theory calculations for thermal radiation at 12 A GeV
 - Fireball model with a coarse-graining approach
- Highest multiplicities
- New detector simulations
 - Final detector geometries
 - Time-based analysis
 - Detailed electronics simulations

Thermal calculations



* arXiv: 1512.08688

Test injection in the chip prototype



Simulated electronics response

