Emissivity of Baryon-Rich Matter – Dilepton Spectroscopy in CBM

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Motivation
Explore QCD phase structure
Phase transition(s) and critical point
- Measure caloric curve for the hadron-QGP phase
Chiral Symmetry restoration
- Measure in-medium $\rho$ spectral function ($\rho$ -- $\omega$ chiral mixing)

Electron identification
Particle tracking:
- STS (in dipole magnet) + TRD + TOF
Particle identification (PID):
- RICH → Artificial Neural Network
- TRD → Likelihood methods
- TOF

Muon identification
Exchange RICH by MUCH
Instrumented absorbers:
60 cm C + (20+20+30+100) cm Fe
Track topology of muon track candidates

Simulation input
Background events:
- 5 million UrQMD events
Signals:

Phase space
Phase space distribution of reconstructed $\omega$ signals

Invariant mass spectra
Dielectron Spectra
Combinatorial background at top right
Reconstructed pairs of same events in red

Dimuon Spectrum
Full scale simulation with 5 million events
Background estimation via event mixing

Signal-to-background
Dielectron ratio top
Dimuon ratio bottom
Signal to combinatorial background ratio above 10%
Especially high ratios for:
- $\gamma$ photons
- $\omega$
- $\phi$

Thermal radiation
Access to thermal radiation at intermediate mass range
Signals are corrected for acceptance and efficiency
Fit function: $M^3 \cdot e^{-\frac{M}{T}}$
The running day 1 scenario will be 4 weeks at 200 kHz interaction rate
- Later go to 1-10 MHz
Investigation of systematic errors in progress