A Muon Detection System For CBM Experiment @FAIR
Anand K. Dubey
Variable Energy Cyclotron Centre (VECC), Kolkata, India
(for the CBM Collaboration)

Compressed Baryonic Matter (CBM) Experiment @FAIR

CMB physics program:
- Equilibration state at Hg to 3
- Deconfinement phase transition
- QCD critical endpoint
- Chiral symmetry restoration

Diagnostic probes of the high-density phase:
- Low-mass vector mesons
- Multistrange hyperons
- Rare fluctuations, correlations

MuCh (SIS100):
- 4 detector stations and 4 absorbers
- 3 detector stations and 5 absorbers

MuCh (SIS500):
- 4 detector stations and 5 absorbers
- 3 detector stations and 6 absorbers

Inputs for Detector Optimization
- LQCD background:
  - Focus on Au+Au
  - J/ψ

Choice of detector technology:
- To cope up with high rate capability (up to 1 MHz/cm²)
- granularity up to 1 b花椒/cm²
- high signal-to-background
- Large area detector: modular
- Detectors to be used in a staggered mode

Detector Development (GEM R&D)

Towards building and testing a large size GEM detector

Sector shaped readout PCB with progressively increasing square pads from 2.8 mm to 6.4 cm GEM detector.

Straw Tube R&D
Full Size Engineering Prototype

Spatial Resolution (Radial): Best resolution ~186 µm (1 bar); < 50 µm per layer
Spatial Resolution (Longitudinal): High resolution (~50 µm) for long beam interaction time

Summary and Outlook
- Dimuon measurement is at the core of the CBM physics program
- Feasibility studies performed for a layout with segmented absorber and detector triplets
- Different detector technologies will be implemented at different stations
- SIS100 layout R&D completed, can be extended to SIS300 chambers
- Detector tests using self-triggered ASICs (KXYTER) and subsequent R&D on MUCH@SIS100 shows the option taken for readout
- Prototype tests highlight the desired design criteria. A new MUCH test using detectors and instrumented absorbers has been carried out. More such tests would be performed
- Mechanical design underway for superstructure and detector chambers.