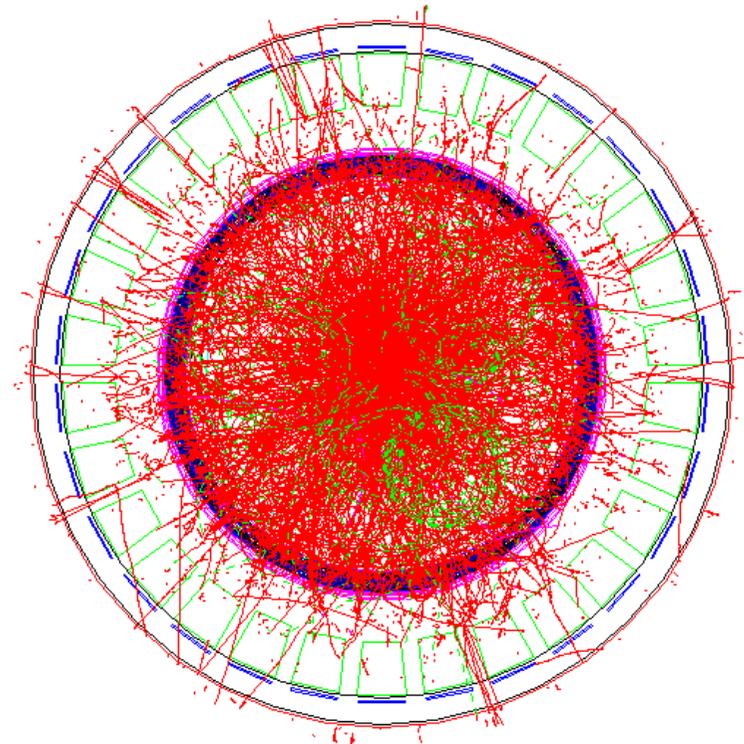
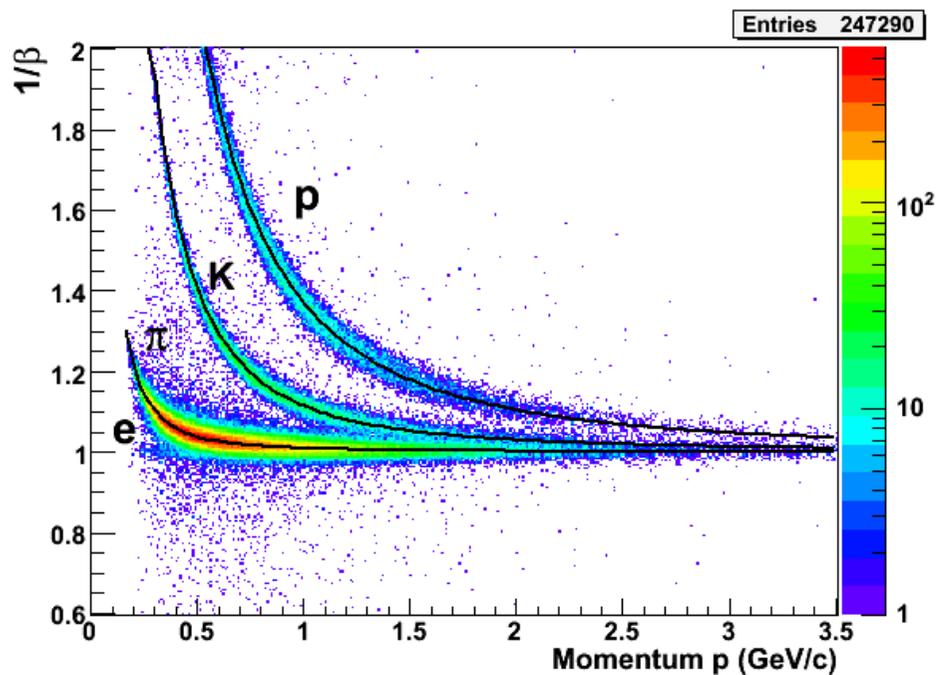




proposal for large-area high-rate Time-of-Flight and Muon Telescope Detector with MRPC technology for EIC

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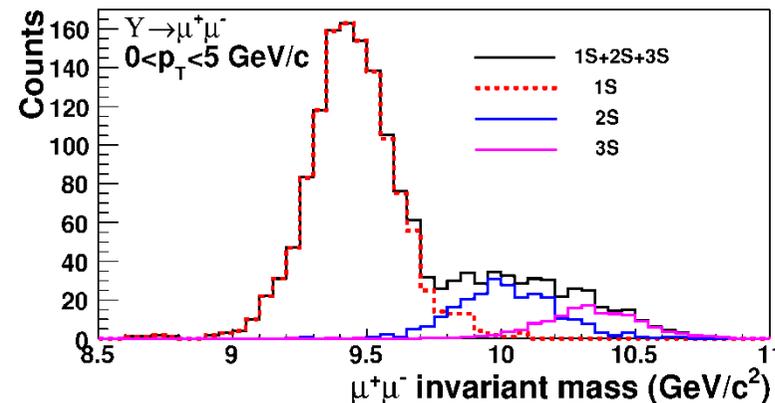
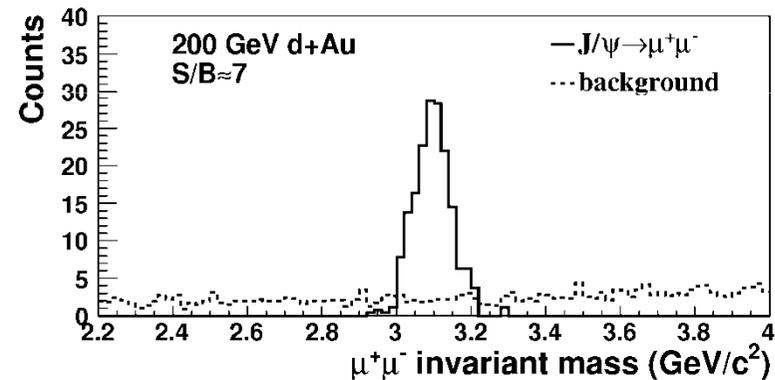
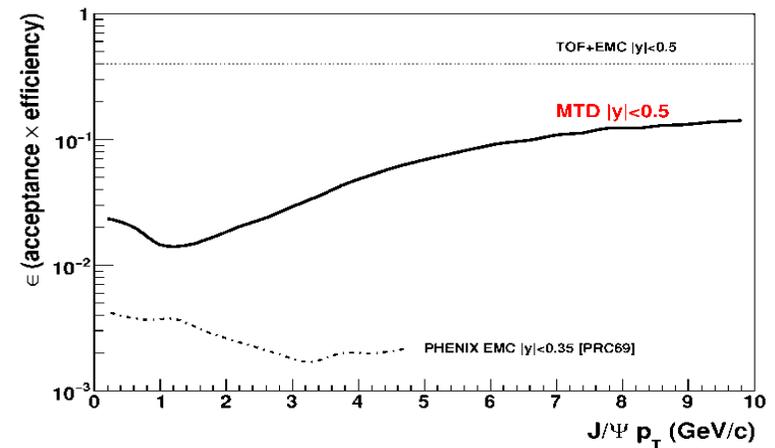


Large-area high-rate MRPC TOF

- STAR large-area Time-of-Flight
 - Glass with bulk resistivity 10^{12} - 10^{13} Ω cm
 - Rate limit 200Hz/cm²
 - Efficiency ~95%
 - Timing Resolution: 80ps
 - Pad size: 3x6cm²
 - Channels: 23040
 - Area: 55m²
 - Budget: 4.8+2.5 M\$
 - 75% at STAR in run9
- 
- EIC Time-of-Flight
 - High luminosity
 - Rate dependence on
 - Distance to IP
 - Eta range
 - silicate glasses and semi-conductor ceramics: bulk resistivity is 10^9 - 10^{10} Ω cm (30KHz/cm²)
 - R&D in China for CBM
 - Stability and performance
 - Possible range of resolution: 30—100ps
 - New electronics for trigger and readout

Muon Telescope Detector for EIC

- Proposed MTD at STAR
- Long MRPC strip
- Gas and material same as TOF
- 400cm from IP, 56% in ϕ and area of 50m^2
- Trigger on dimuon in p+p: $>10^5$ rejection
- Cost: $<2\text{M}\$$
- **EIC: exclusive vector meson (J/Ψ) production**



Conclusions

- **Produce prototype MRPCs** with new materials that allow high rates and test these prototypes under real beam conditions to study their performance and long term stability;
- **Perform simulations based on EIC physics processes** and beam conditions to further improve the system design and detector requirements related to the TOF. This includes a large-area barrel Time-of-Flight system, the necessary start-timing detection of the tagged out-going beam electron, and the Muon telescope detector for muon identification;
- Achieving the required high rate capabilities of all of these detectors requires **a parallel development of the associated electronics**. Our group has considerable experience there.