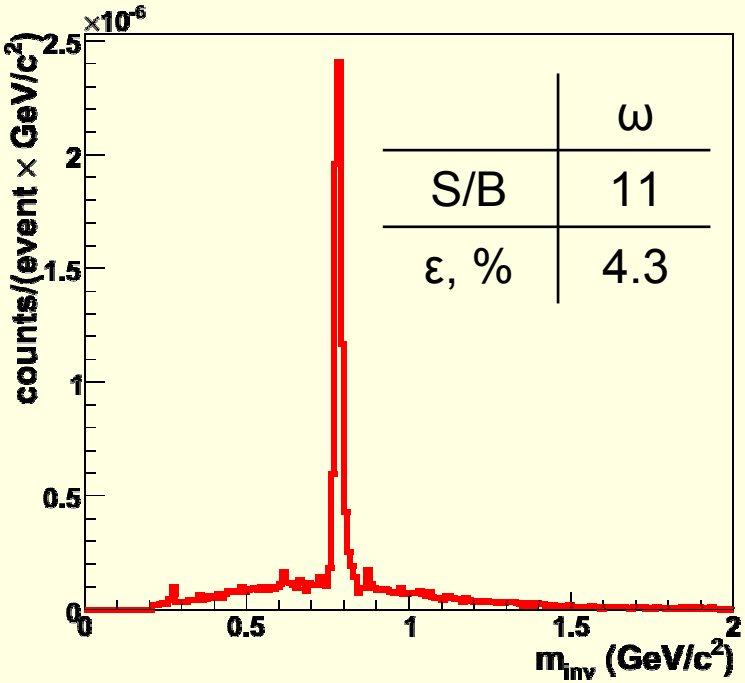
$p+A \rightarrow J/\psi + X$
$J/\psi \rightarrow \mu^+\mu^-$
at SIS100 energies

Anna Kiseleva

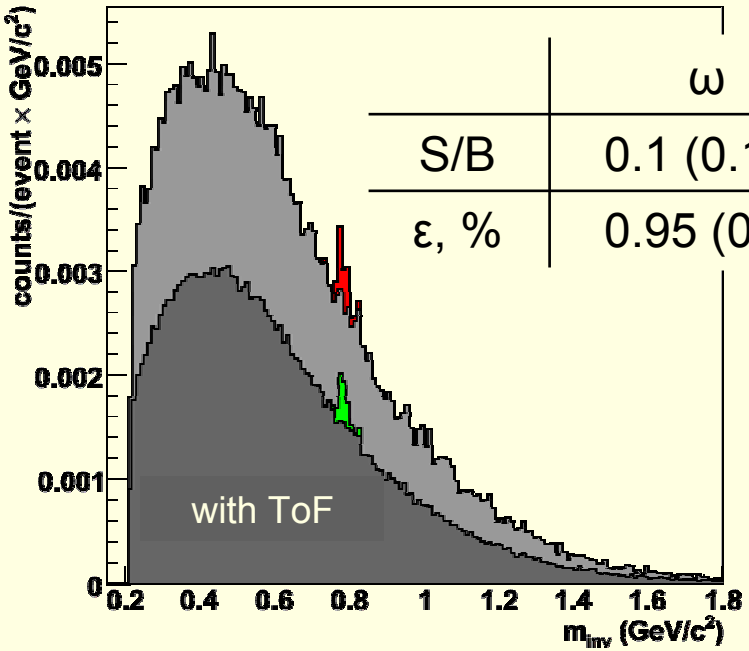
Dimuon measurements at SIS100

ω→μ⁺μ⁻ + p+C collisions @ 30GeV



	ω
S/B	11
ε, %	4.3

ω→μ⁺μ⁻ + central Au+Au collisions @ 8AGeV



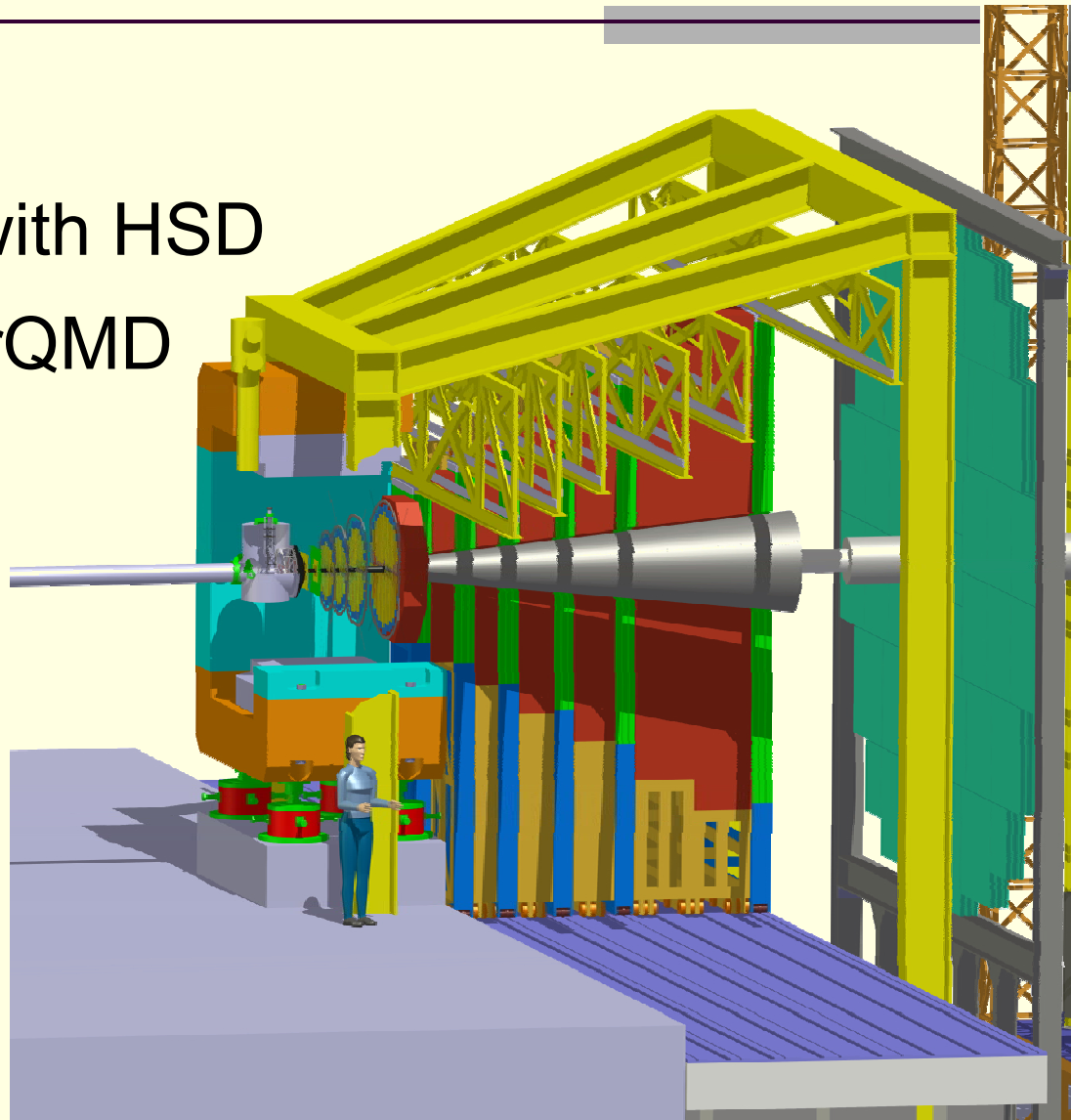
	ω
S/B	0.1 (0.14)
ε, %	0.95 (0.8)

Outline

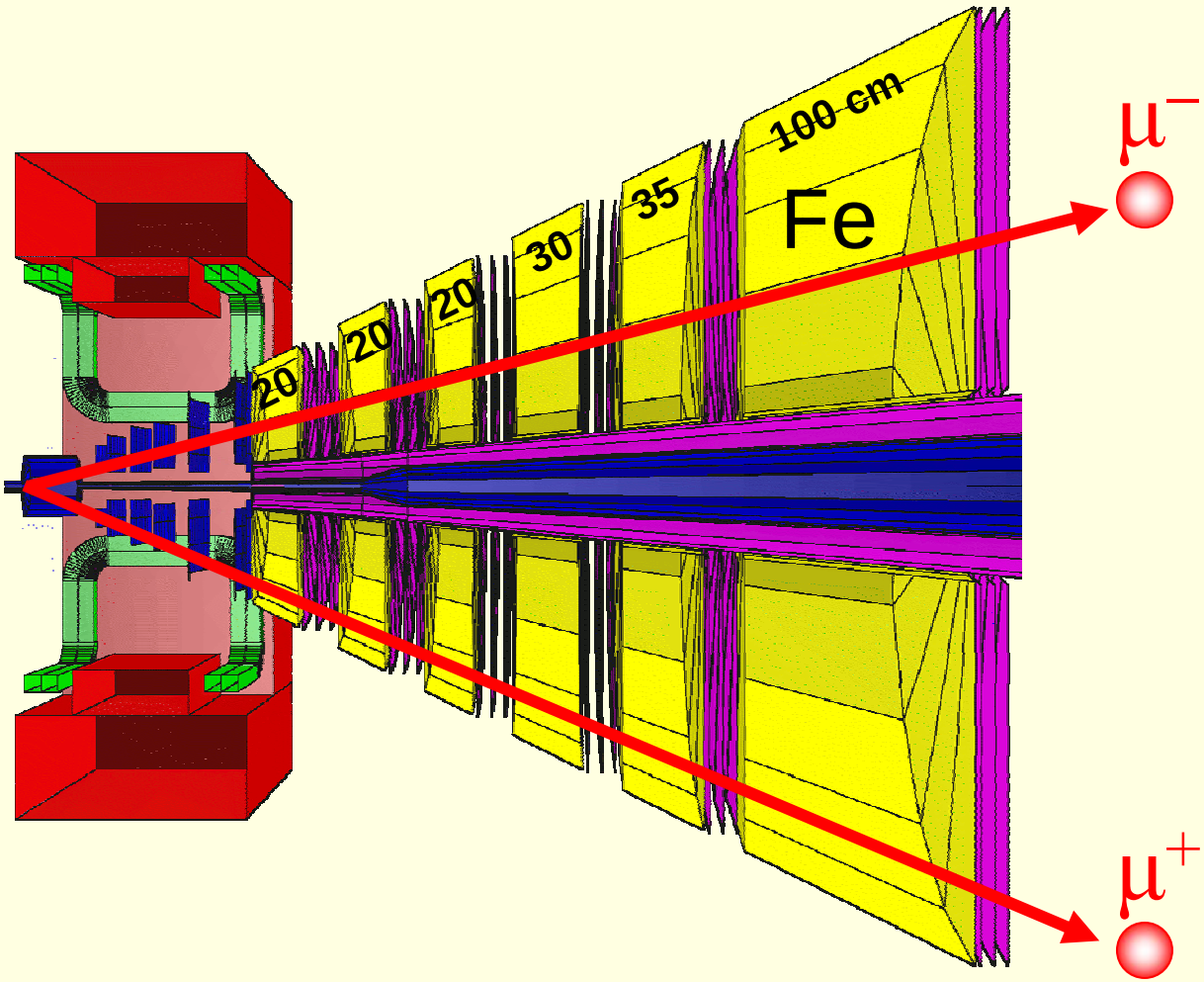
- The CBM Muon detection system
- HSD simulations for J/ψ production in A+A and p+A collisions
- Event reconstruction
- Conclusions

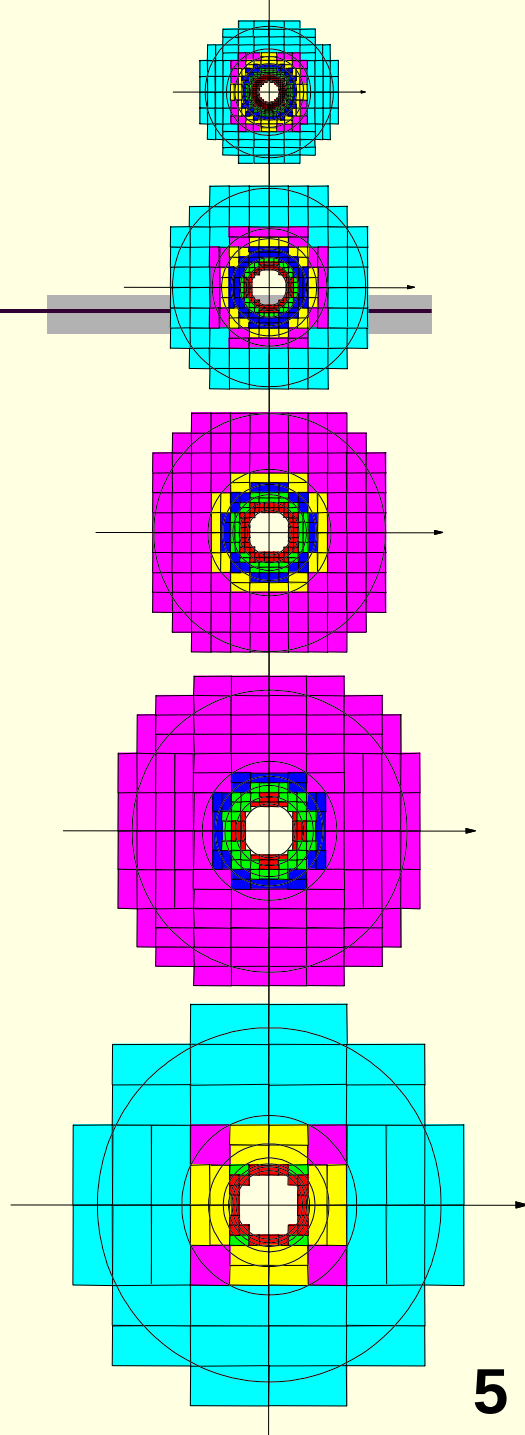
Muon simulations

- cbmroot
- J/ψ generated with HSD
- background: UrQMD

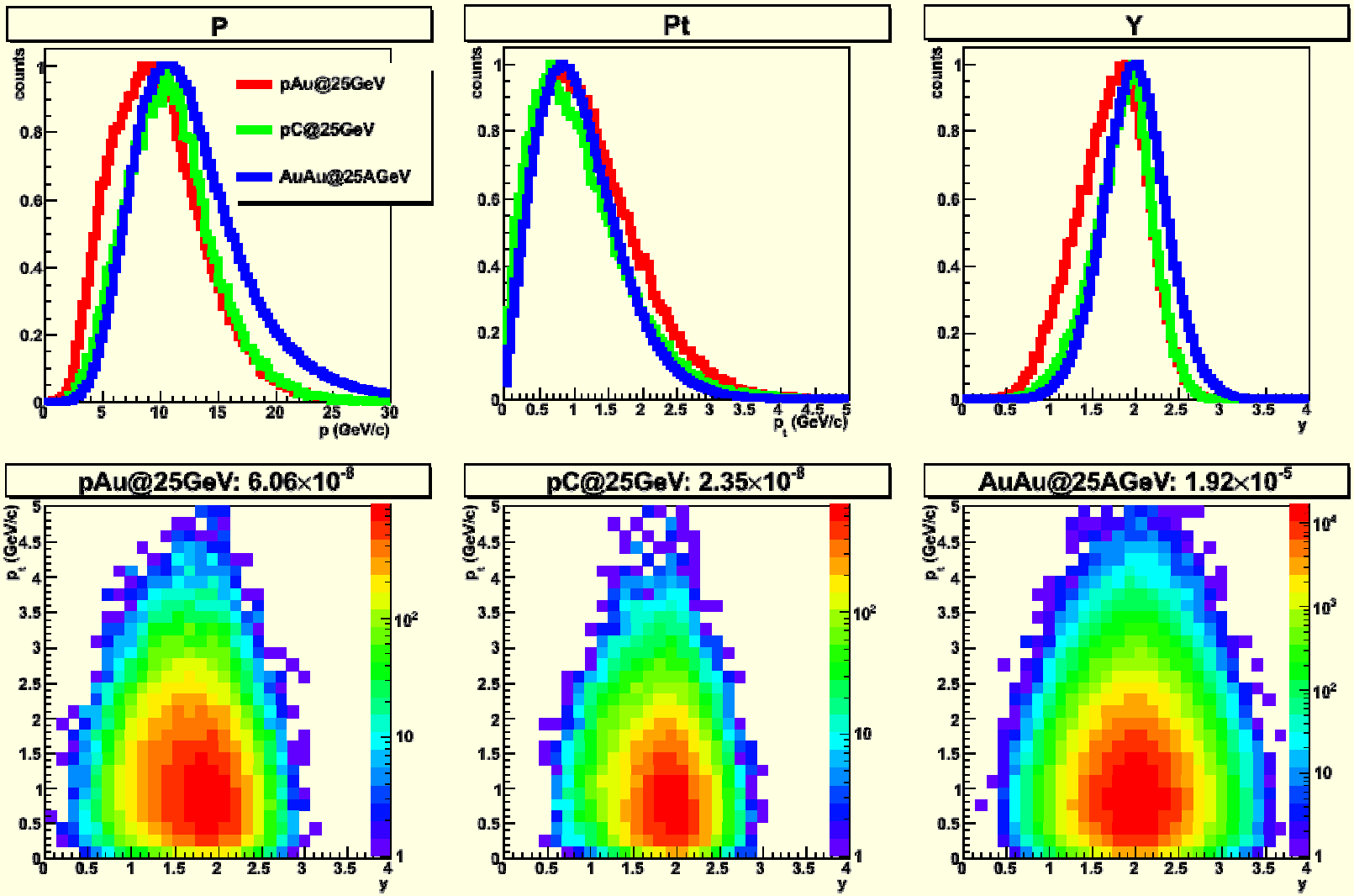


Muon system





J/ψ phase-space distributions for p+Au, p+C, Au+Au (HSD)



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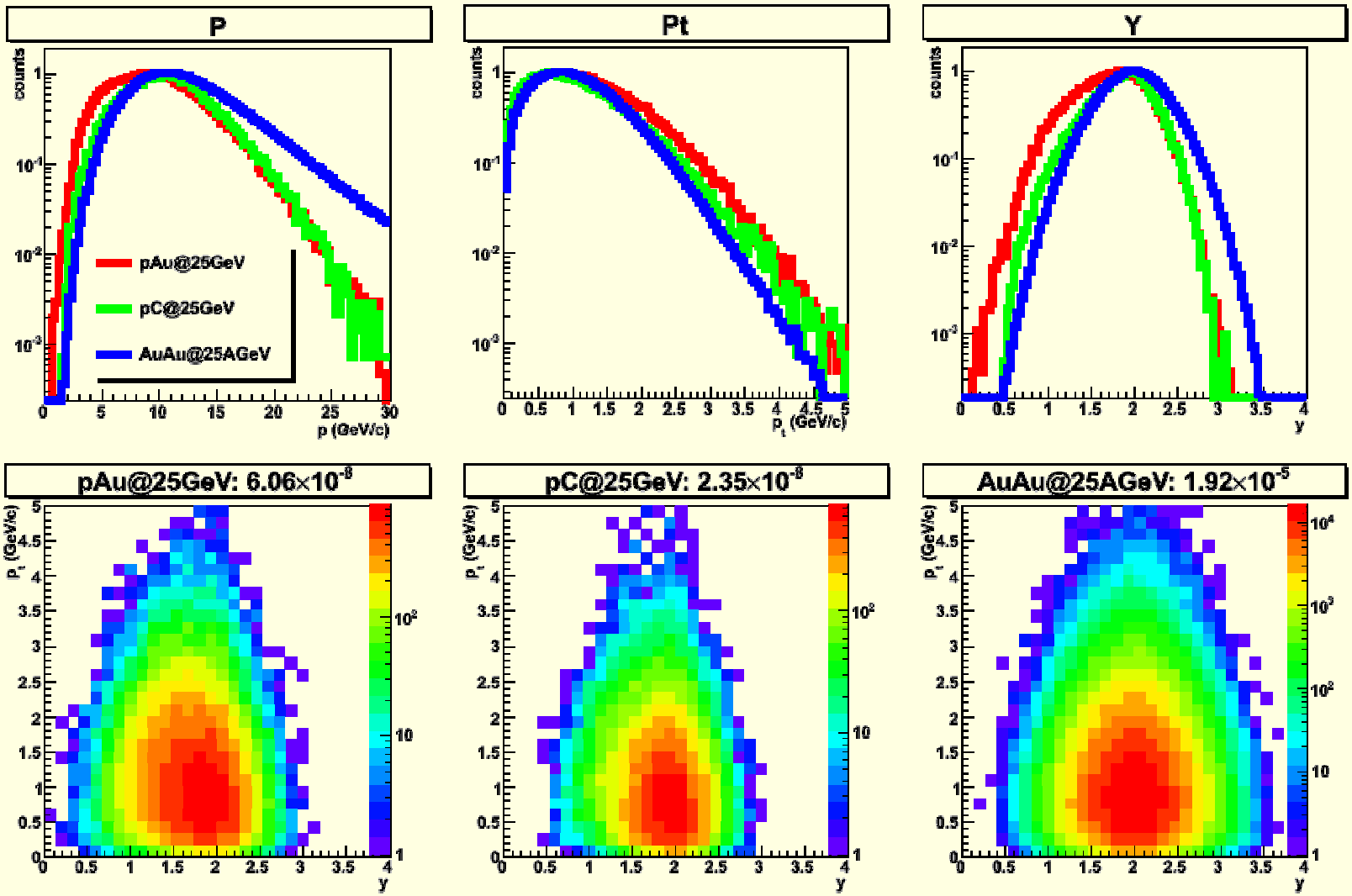


Results

collisions	p+Au @ 25GeV	p+C @ 25GeV
S/B ratio	B=0*	B=0*
efficiency, %	16.4	21.4

* 0 background pairs in J/ψ mass region from 3.4×10^9 events

S/B ratio calculation for p+A

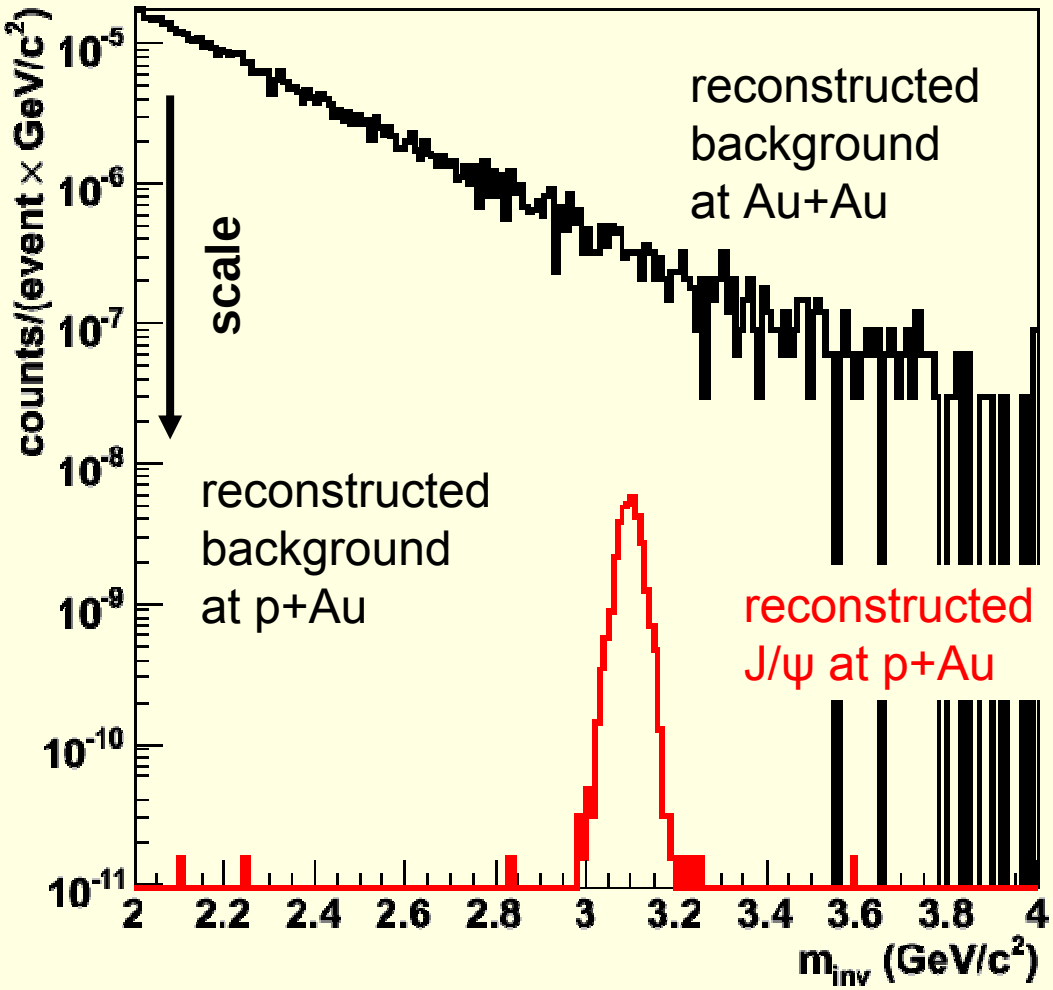
- background from Au+Au@25AGeV
- Normalization to the number of reconstructed background pairs in 3.4×10^9 collisions :
  - N_{Au+Au}: ~9×10^5
  - N_{p+C}: 6
  - N_{p+Au}: 78

$$\text{scale} = \frac{N_{p+Au}}{N_{Au+Au}}$$

$$\text{scale} = \frac{N_{p+C}}{N_{Au+Au}}$$

S/B ratio calculation for p+A

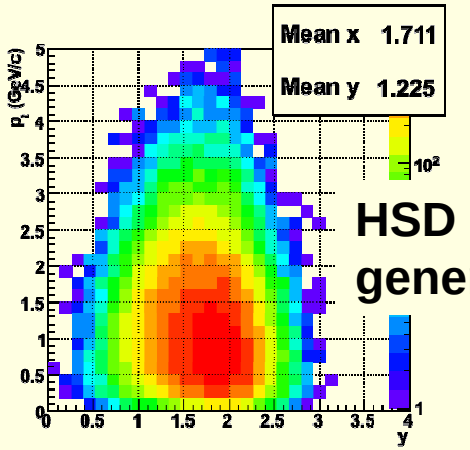
$$\text{scale} = \frac{N_{p+Au}}{N_{Au+Au}}$$



Results

collisions	p+Au @ 25GeV	p+C @ 25GeV
S/B ratio	187	1368
efficiency, %	16.4	21.4

J/ψ acceptance for p+Au@25GeV



HSD generated

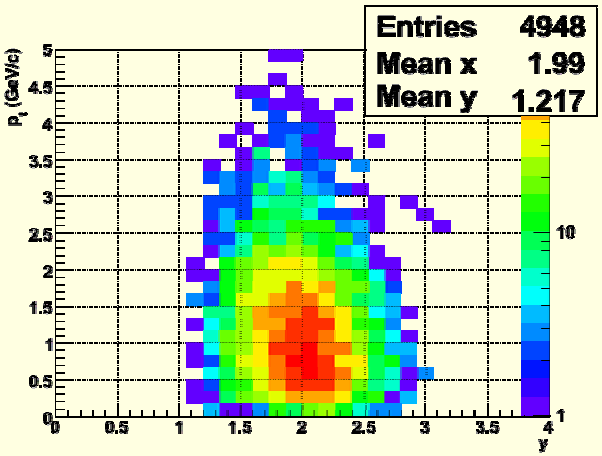
Losses:

STS
1. geometrical acceptance 6° - 25°
2. magnet field
3. absorption in MuCh

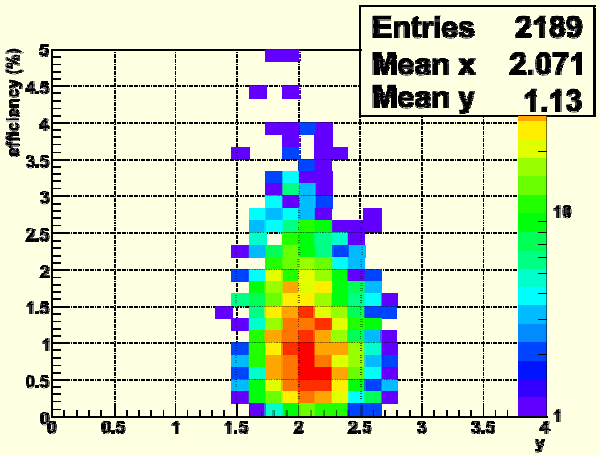
STS + MuCh

4. reconstruction efficiency

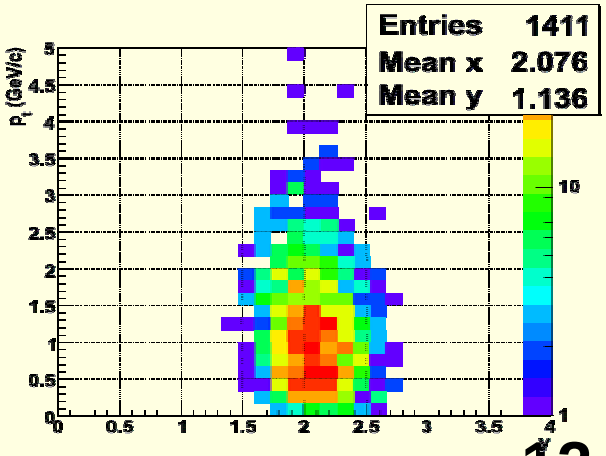
STS
(≥4 STS points)



STS+MuCh
(≥4 STS points+18 MuCh points)

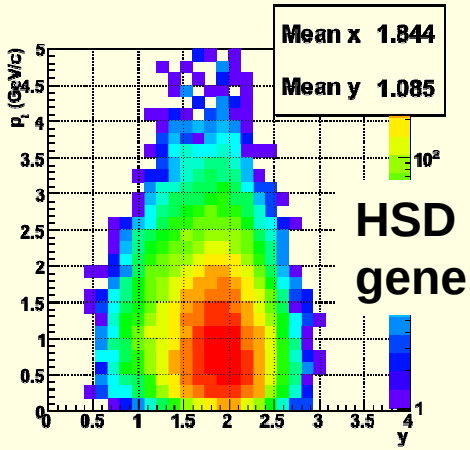


reconstructed



10 000 events with J/ψ

J/ψ acceptance for p+C@25GeV



HSD generated

Losses:

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1. geometrical acceptance 6° - 25°
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STS
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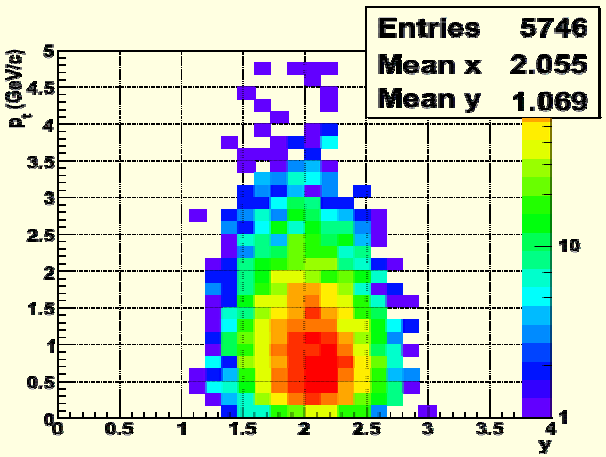
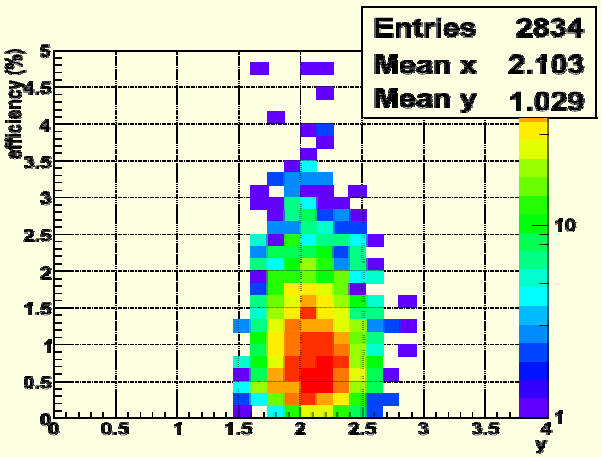
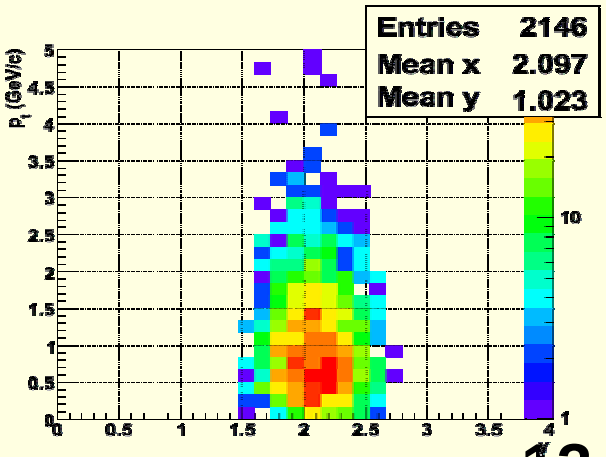


STS+MuCh
(≥4 STS points+18 MuCh points)



reconstructed



11 000 events with J/ψ

Conclusion

- $J/\psi \rightarrow \mu^+\mu^-$ measurements at SIS100 (p+C and p+Au at 25 GeV) are feasible with the CBM muon detection system

- Physics case: study of charm propagation in cold nuclear matter