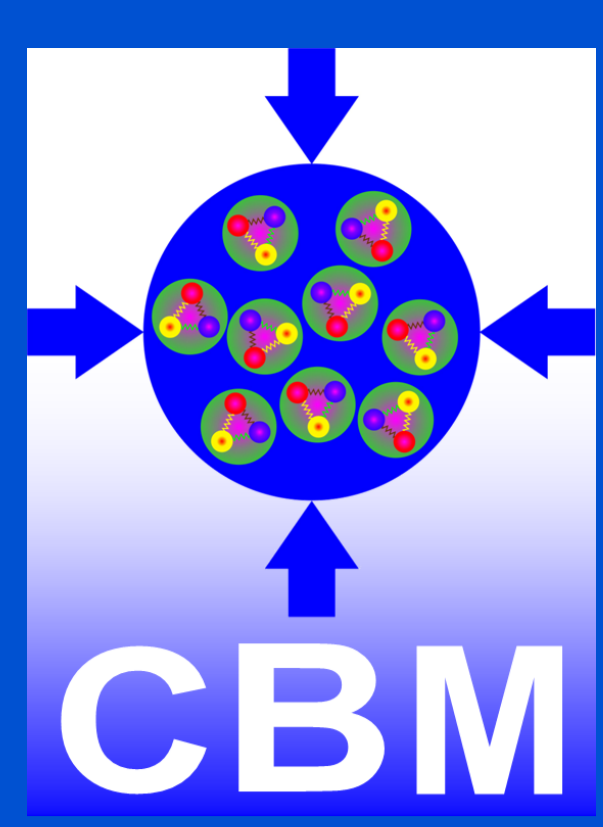


# Measurement of rare probes in the CBM experiment at FAIR

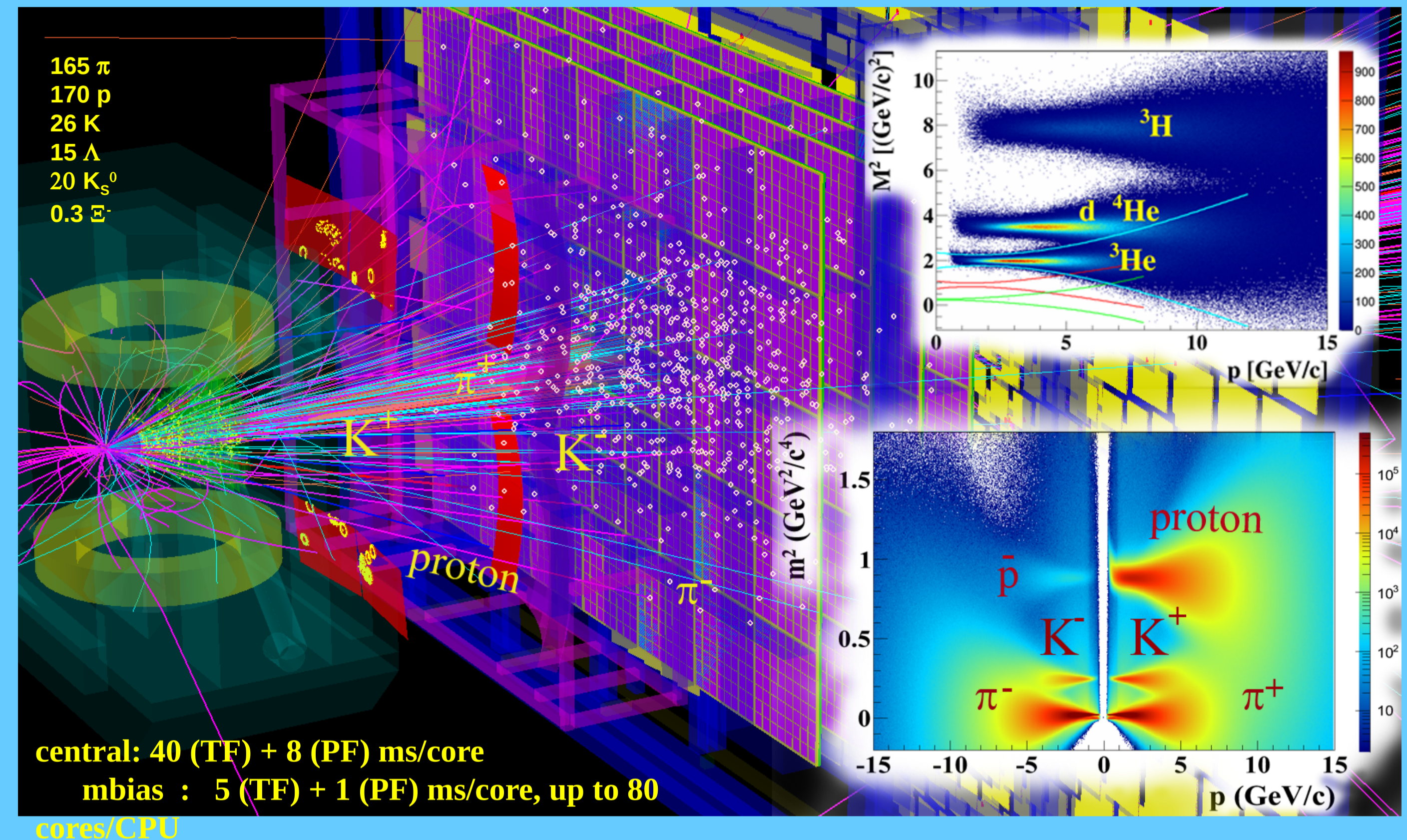
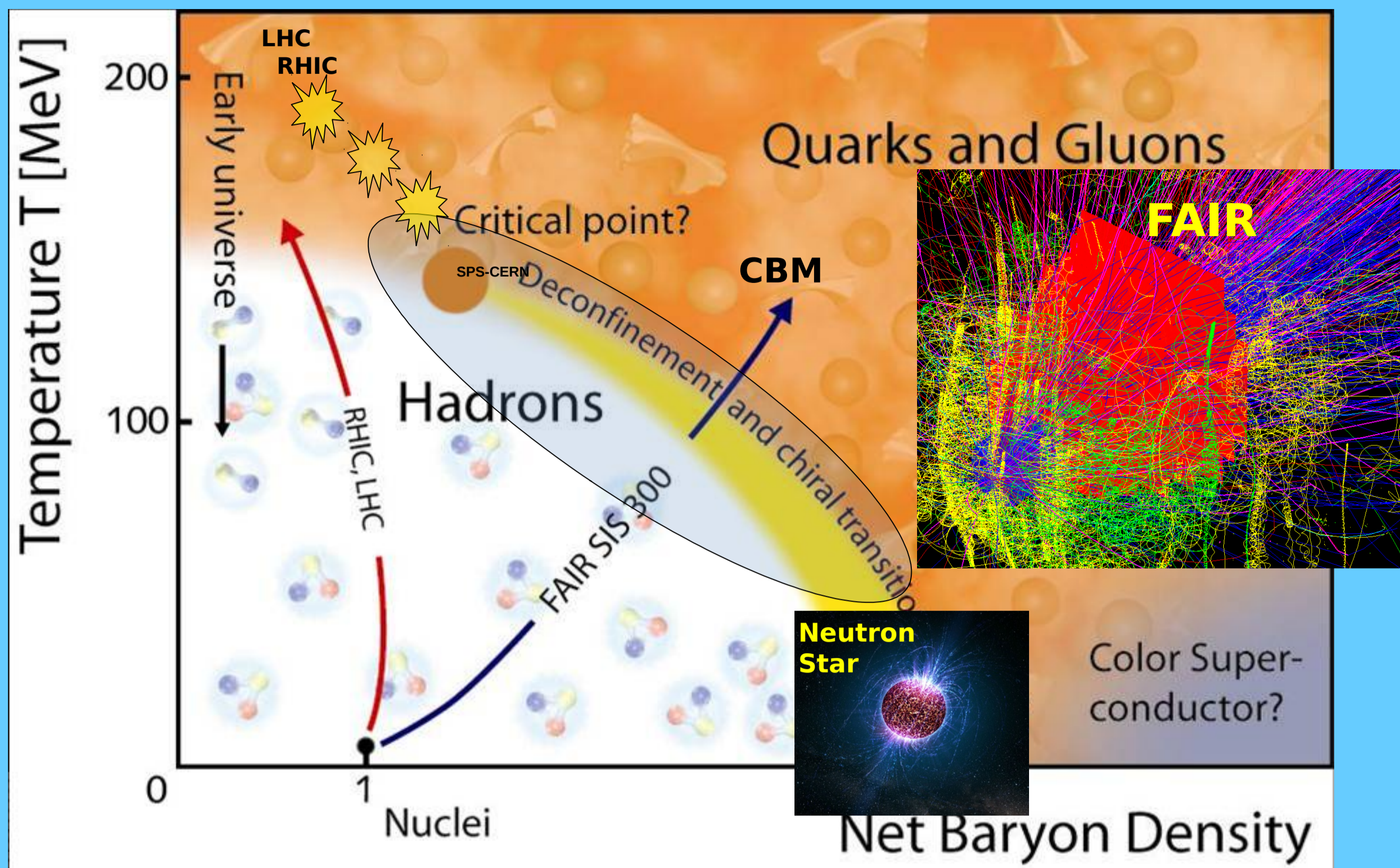
Iouri Vassiliev (for the CBM Collaboration)



Quark Matter 2017

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## CBM UrQMD event at SIS 100



Mapping the phase diagram of strongly interacting matter in the region of high baryon densities.

### Key observables:

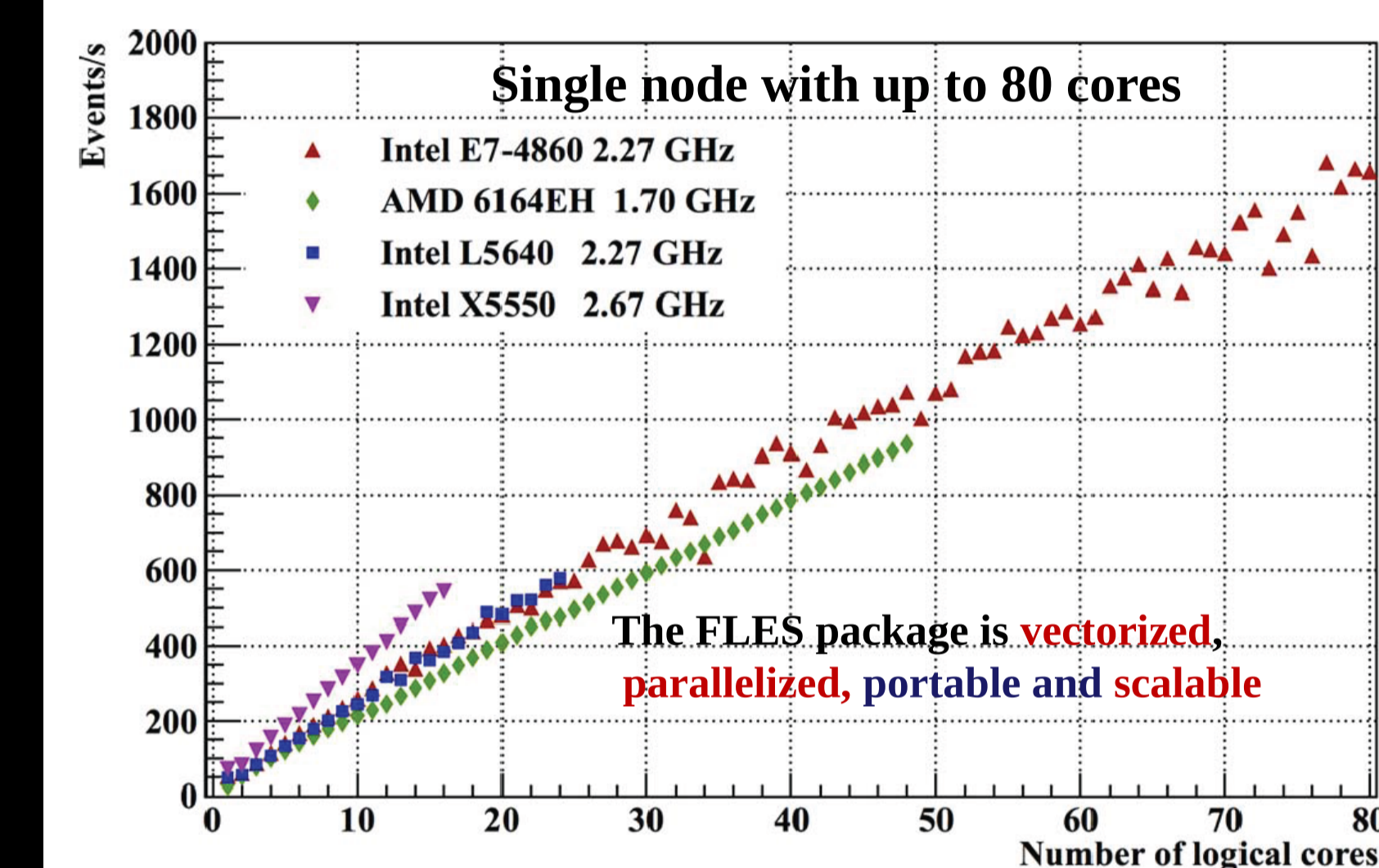
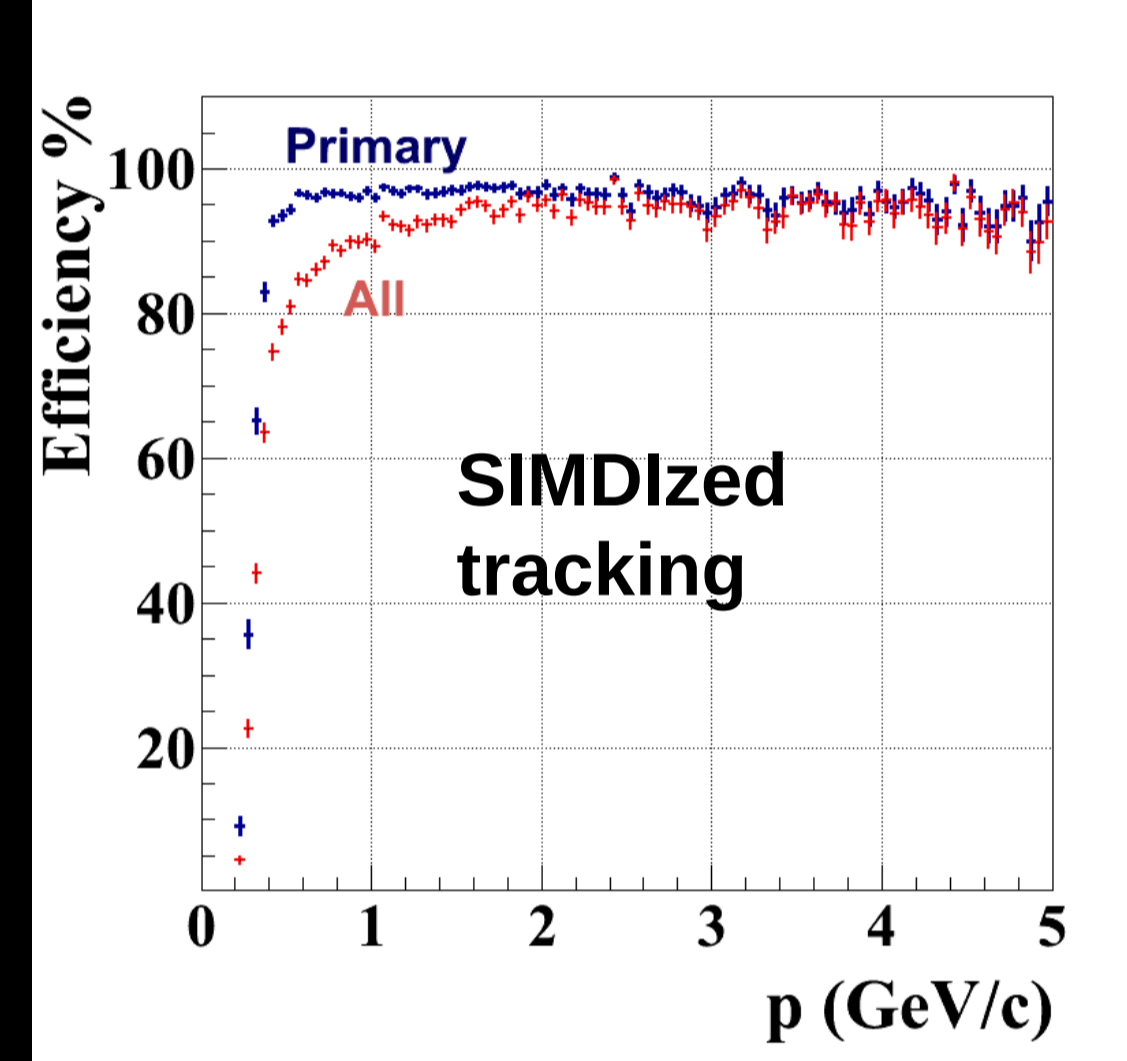
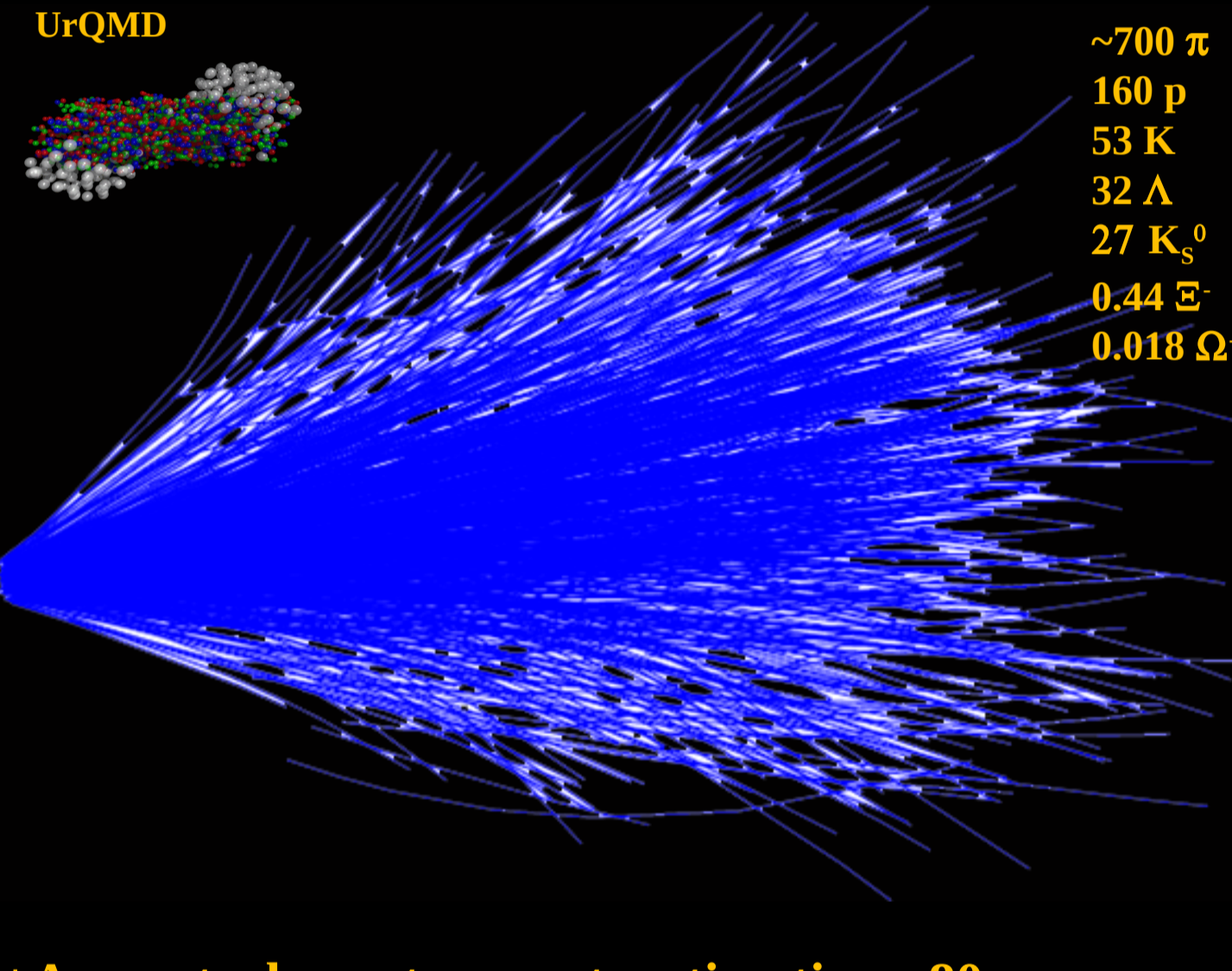
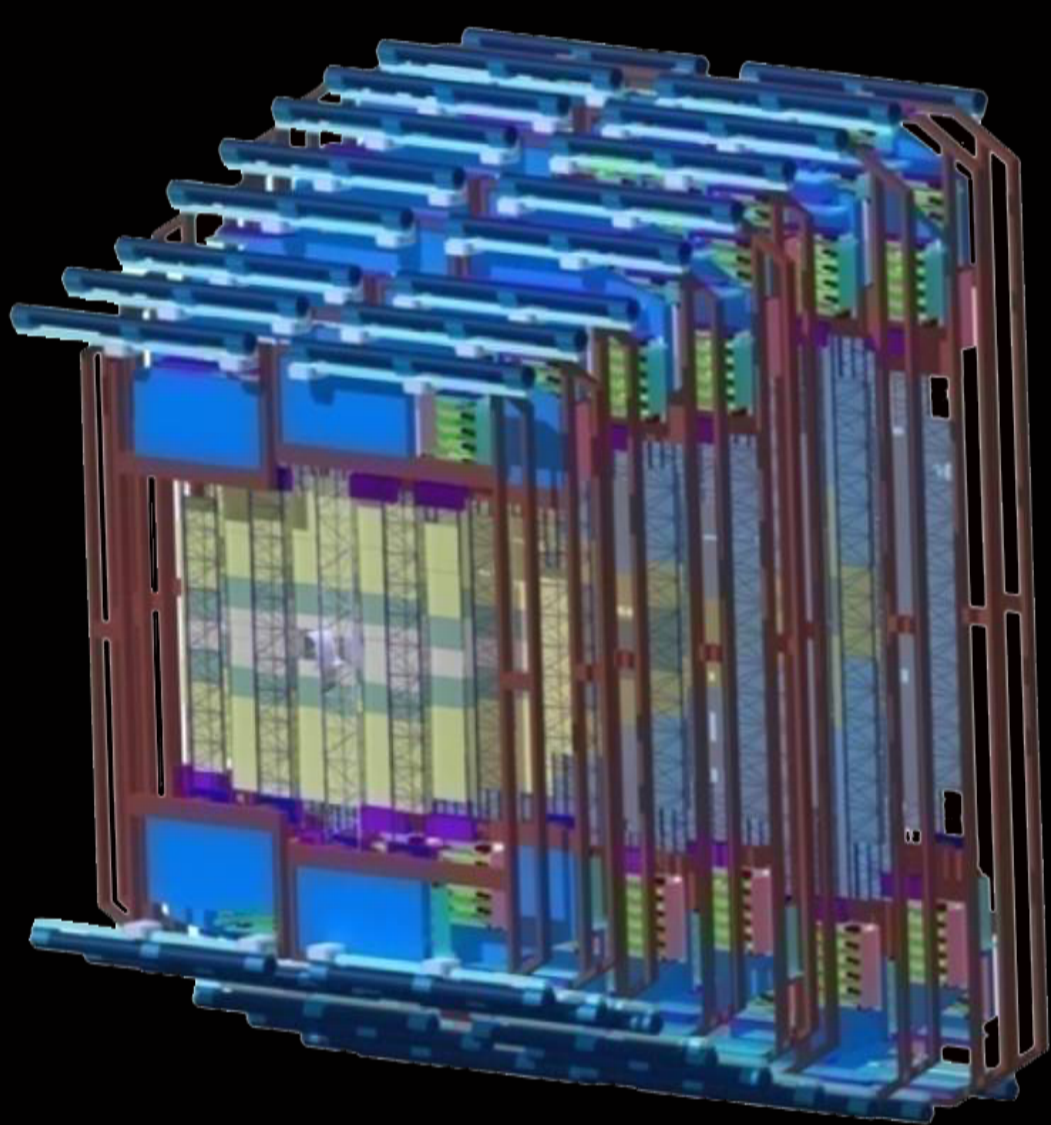
- multi-strange hyperons ( $\Lambda$ ,  $\Xi$ ,  $\Omega$ ) and HYPERnuclei
- short-lived light vector mesons:  $\rho$ ,  $\omega$ ,  $\phi$
- mesons containing charm or anti-charm quarks ( $D$ ,  $A_c$ ,  $J/\psi$ )

- Interaction rates up to  $10^7$  collisions/sec
- up to 1000 charged particles/collision
- Baryon densities  $\sim 5 \rho_0$
- Bulk particles:  $p$ ,  $\pi$ ,  $K$ ,  $\Lambda$ ,  $\Sigma$
- Rare probes:  $\Xi$ ,  $\Omega$ ,  ${}^3_\Lambda\text{He}$ ,  ${}^4_{\Lambda\Lambda}\text{He}$ ,  $\rho$ ,  $\omega$ ,  $\phi$ ,  $D$ ,  $J/\psi$ ...

### Double-sided silicon strip detector

### Fast and highly efficient tracking with STS detector

- r/o cables:  $2 \times 0.11\% X_0$
- sensor:  $0.3\% X_0$
- 8 stations
- 4 sensor types



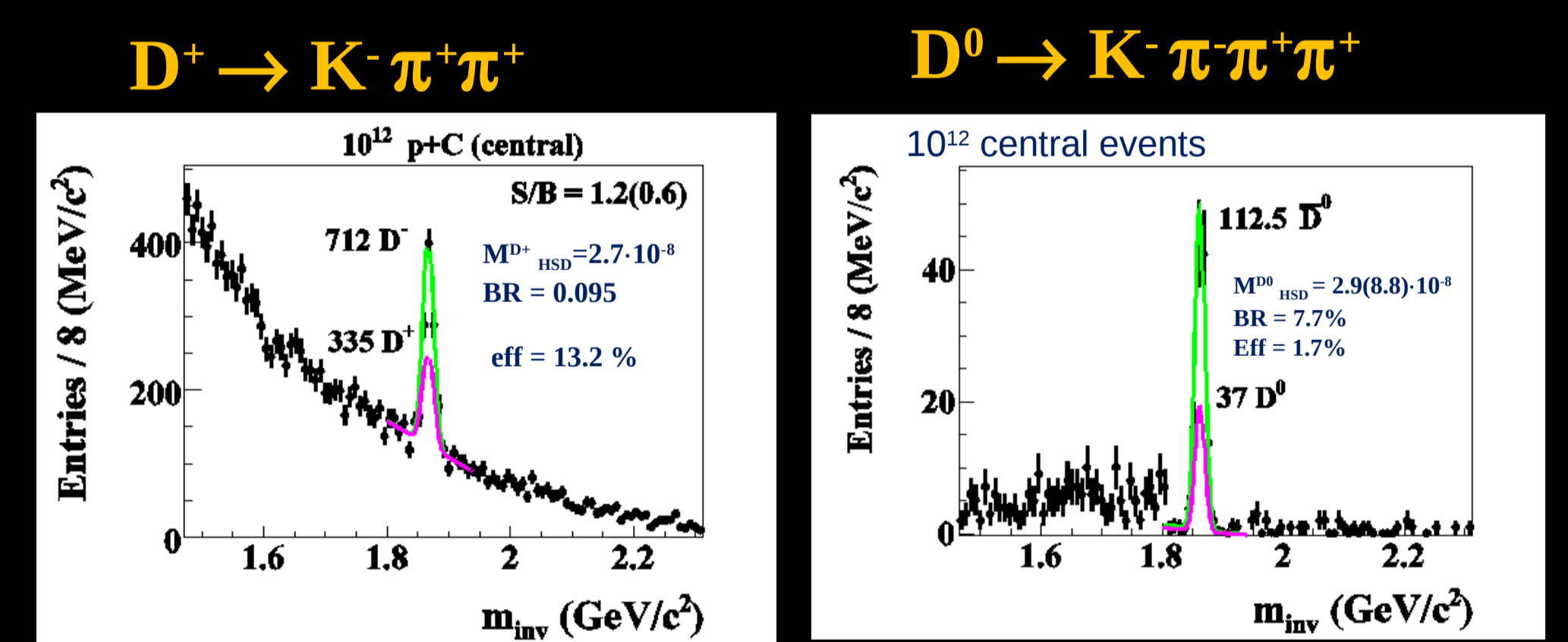
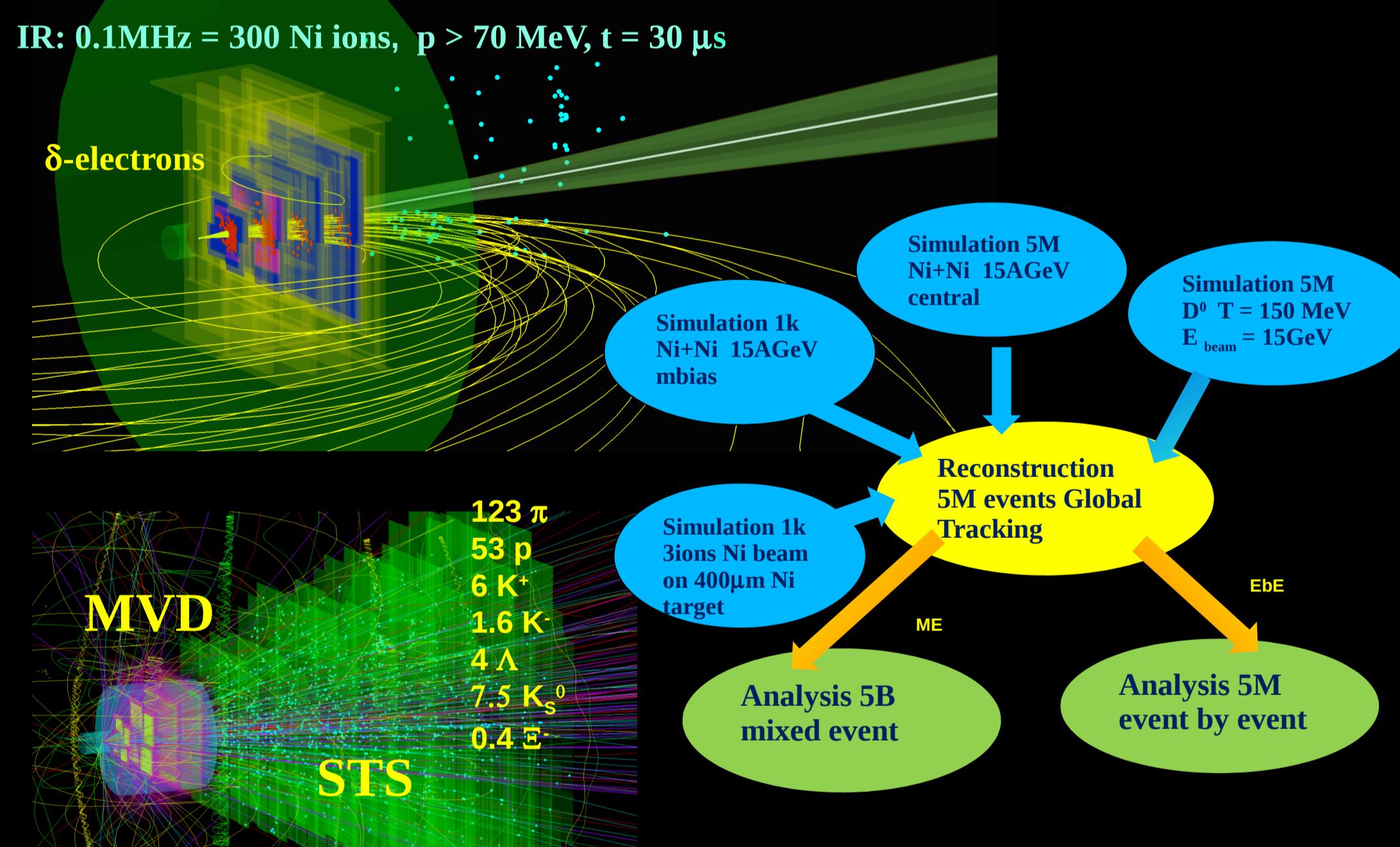
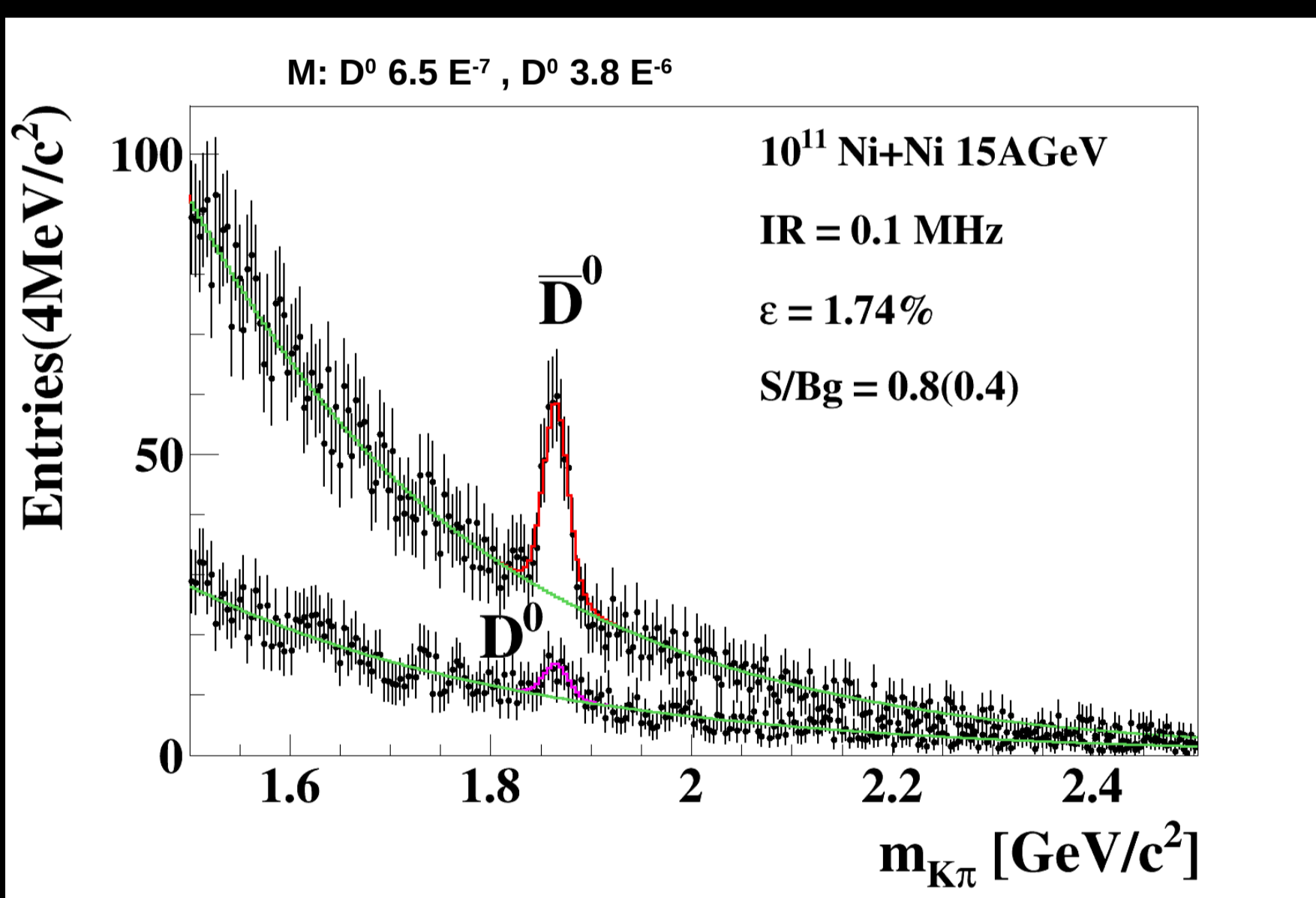
Au+Au central event reconstruction time: 80 ms  
Reference primary tracks reconstruction efficiency: 97%

Excellent tracking efficiency  
All tracks reconstruction efficiency: 86%

Full event/core reconstruction including KF particle analysis of multi-strange (anti) hyperons for min. bias Au+Au collisions at 25 A GeV.

### CBM performance at SIS-100: D-meson analysis package for Ni+Ni @ 15 A GeV

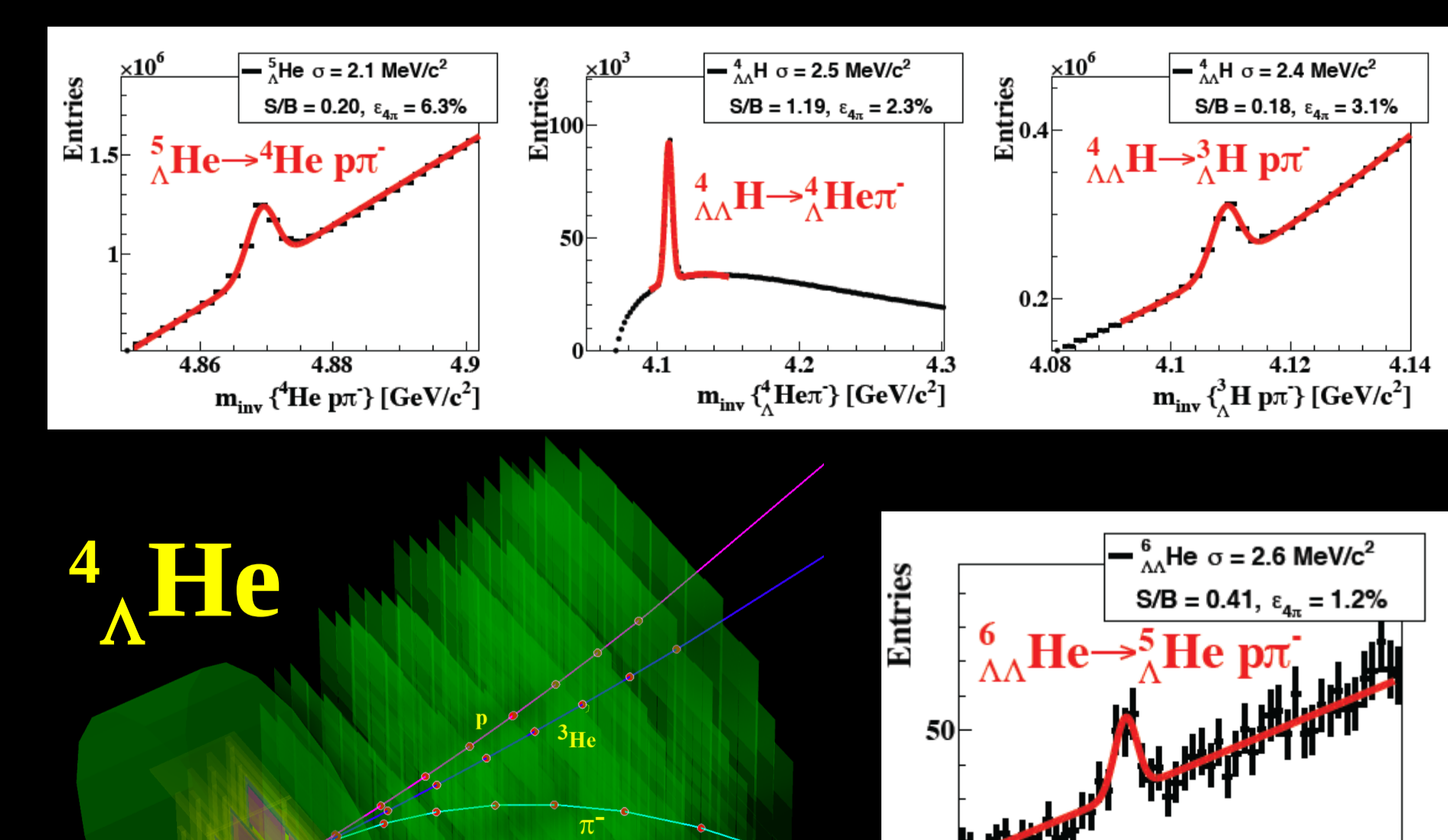
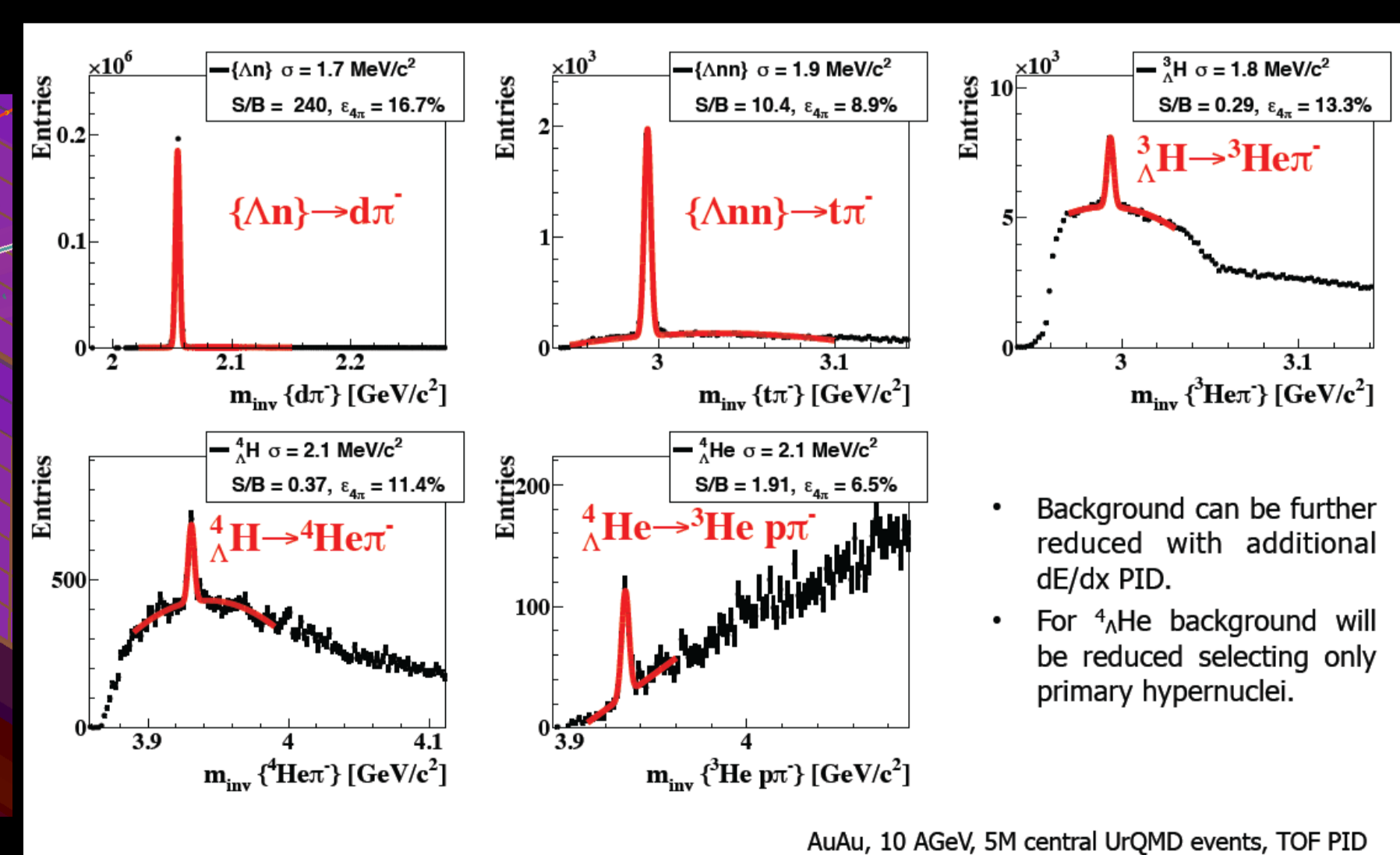
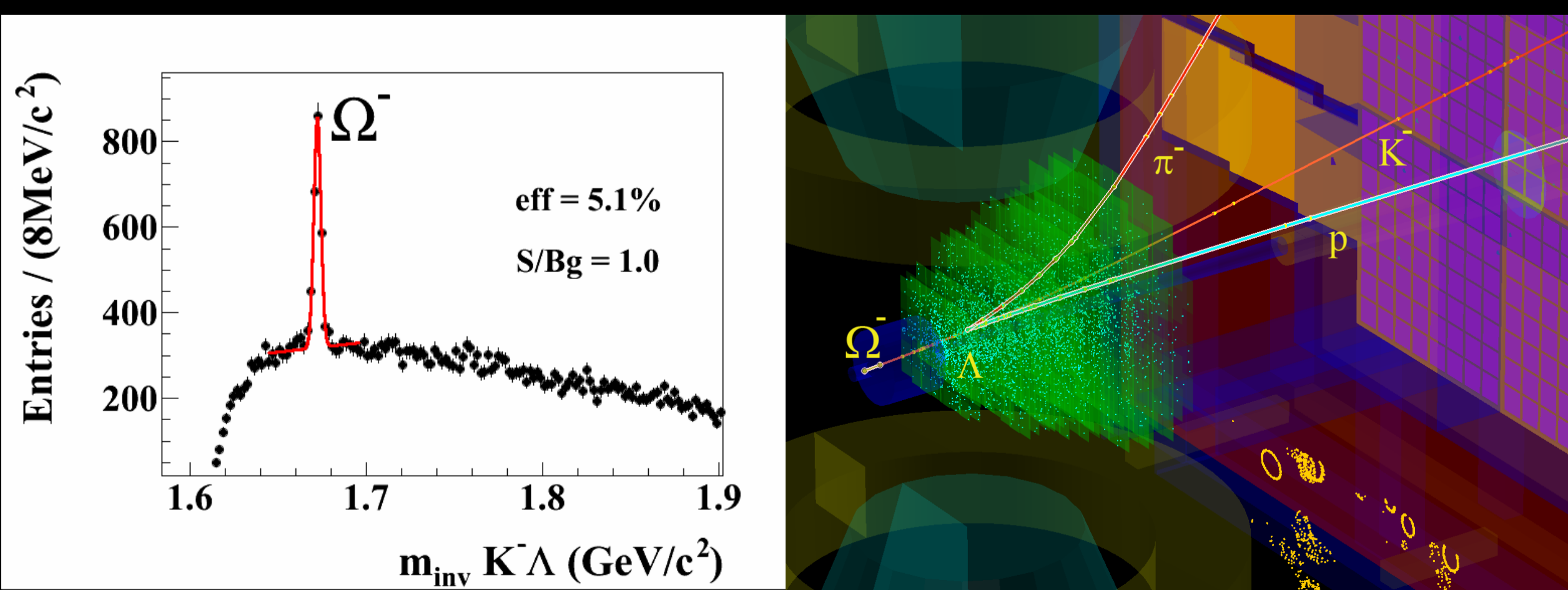
### CBM performance at SIS-100: D-meson reconstruction in p-C collisions at 30 GeV



In 10 weeks: 18k  $D^\pm$  and 3k  $D^0$  at 10 MHz IR with PV BG suppressed 10-30 times!

### Multi-strange hyperons simulations in Au + Au collisions at 10 A GeV

### Hypernuclei in CBM at SIS100 Au + Au 10 A GeV



Direct search of multi-strange hyperons using KFPARTICLE FINDER.  
Five million central Au+Au events were produced by UrQMD model at 10 A GeV.