Particle Ratios and the Phase Structure of Hadronic Matter

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VIIIth INTERNATIONAL CONFERENCE ON STRANGENESS IN QUARK MATTER

SQM 2004

September 15 - 20, 2004

Cape Town
South Africa

Main Topics will be:

- Strange Quarks as a Probe of Hot and Dense Matter
- Strangeness Production from the MeV to the TeV Range
- Heavy Flavour Production in Heavy-Ion Collisions
- Astrophysics of Strangeness
- Strangeness and the QCD Equation of State

Photo by Leon van Heerden

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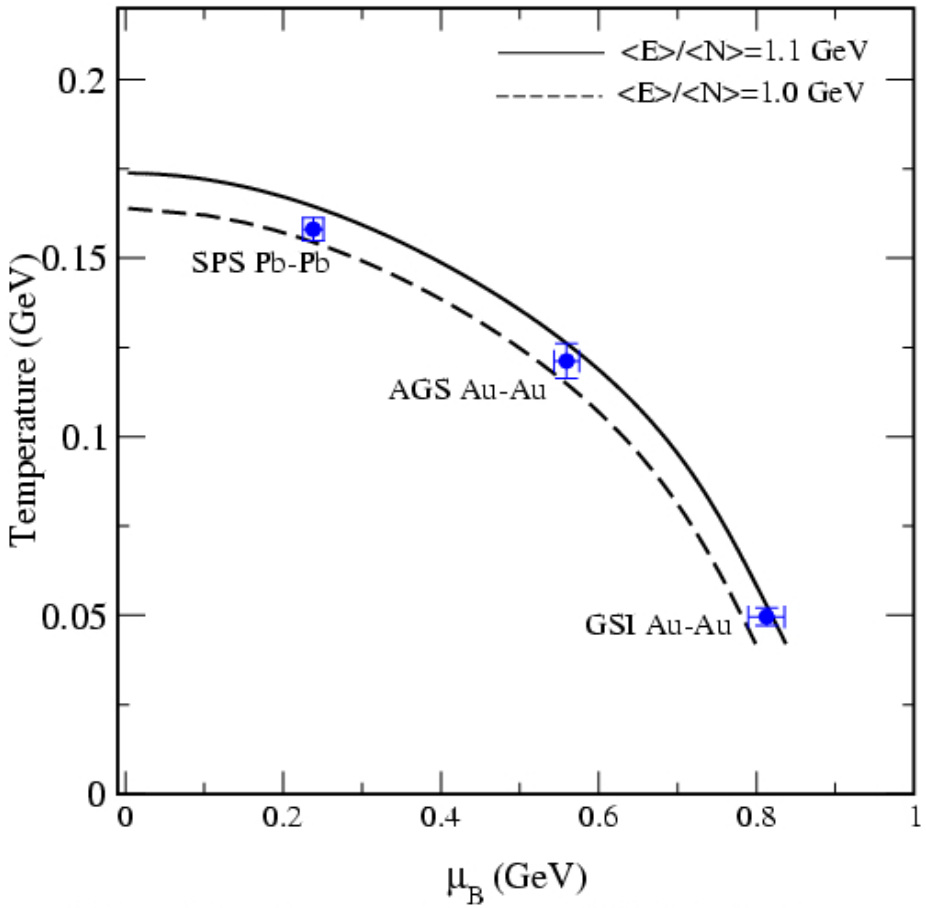
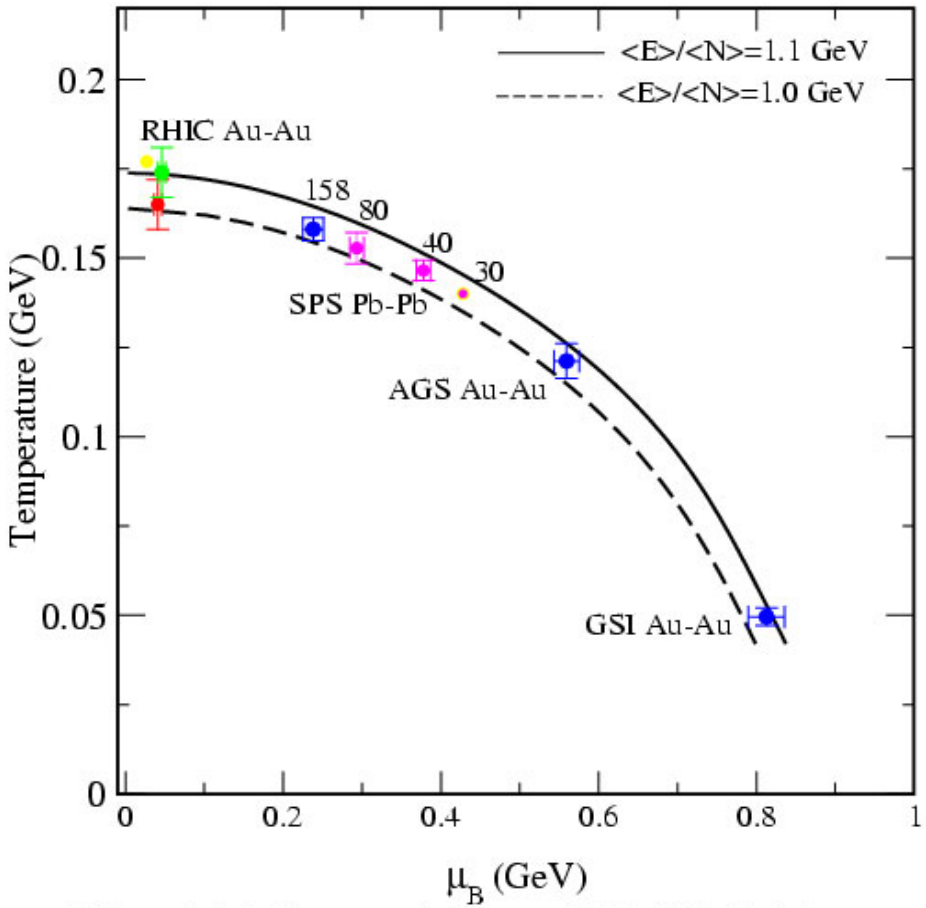
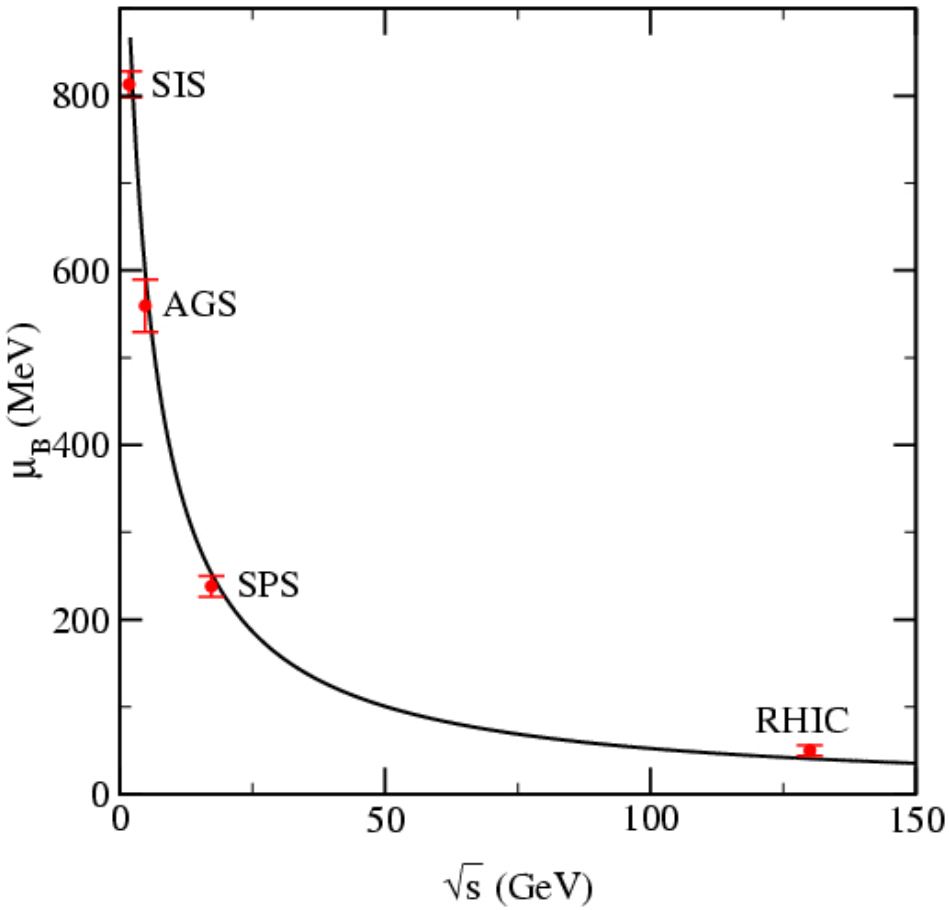
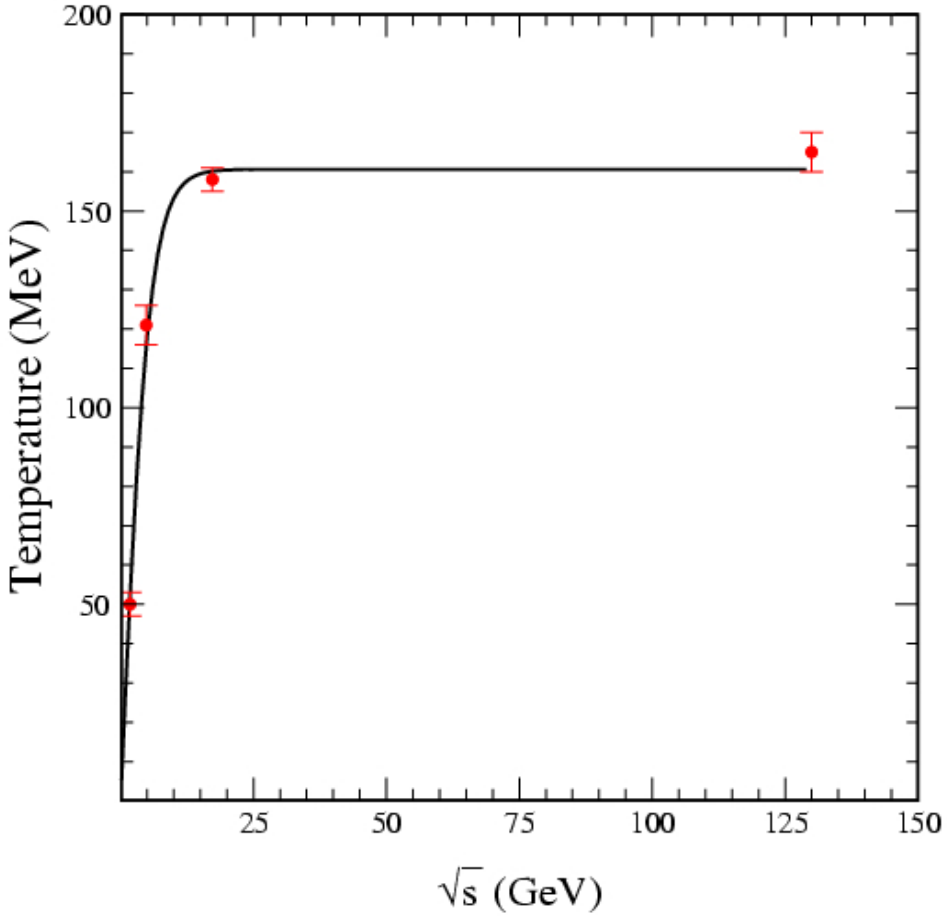


- F. Becattini, J. Cleymans, A. Keranen, K. Redlich, E. Suhonen
  Phys. Rev. C64 (2001) 024901

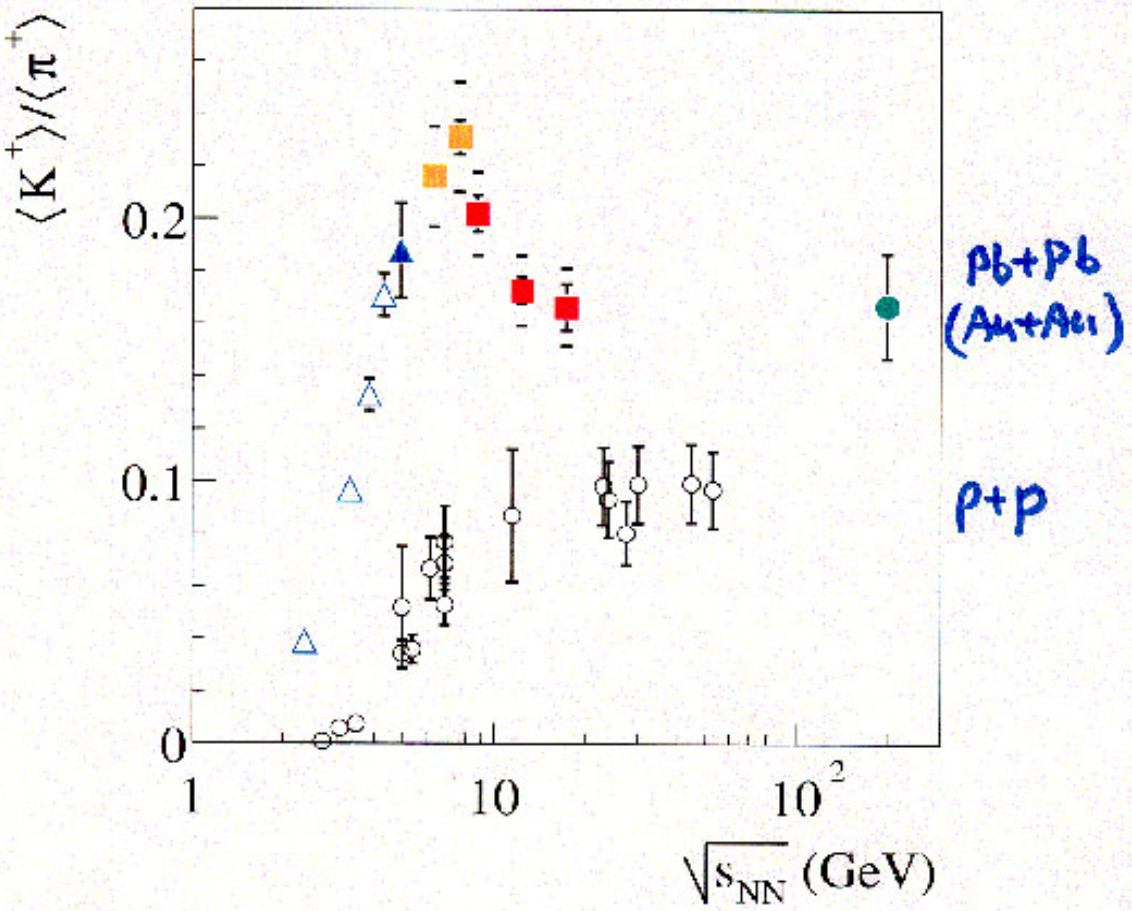


- F. Becattini, J. Cleymans, A. Keranen, K. Redlich, E. Suhonen
  Phys. Rev. C64 (2001) 024901
- W. Florkowski, W. Broniowski, M. Michalec
  Acta Phys. Pol. B33 (2002) 761
- P. Braun-Munzinger, D.Magestro, K. Redlich, J. Stachel
  Phys. Lett. B518 (2001) 41
- J. Manninen, F. Becattini, A. Keranen, M. Gazdzicki, R. Stock
  nucl-th/0405015


SIS
AGS
SPS
RHIC
800
600
400
200
0
0
50
100
150
μ_B (MeV)
$\sqrt{s}$ (GeV)


200
150
100
50
Temperature (MeV)
25
50
75
100
125
150
√s (GeV)

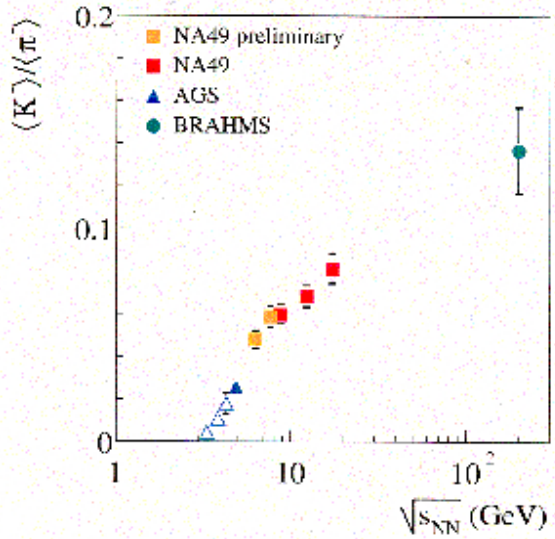
Hadron Multiplicities ($\bar{s}$-QUARK CARRIER)

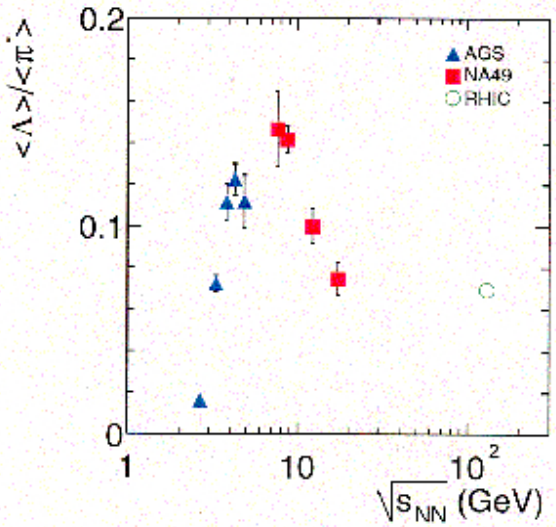


THE HORN

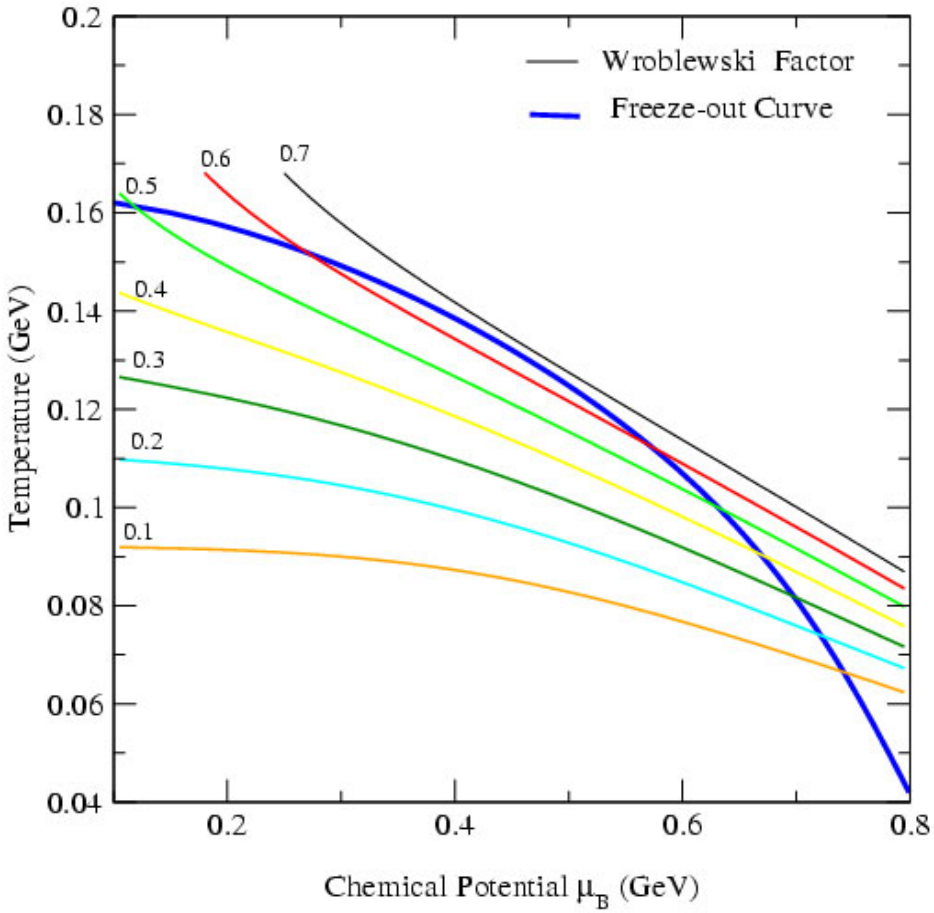
CENTRAL Pb+Pb COLLISIONS

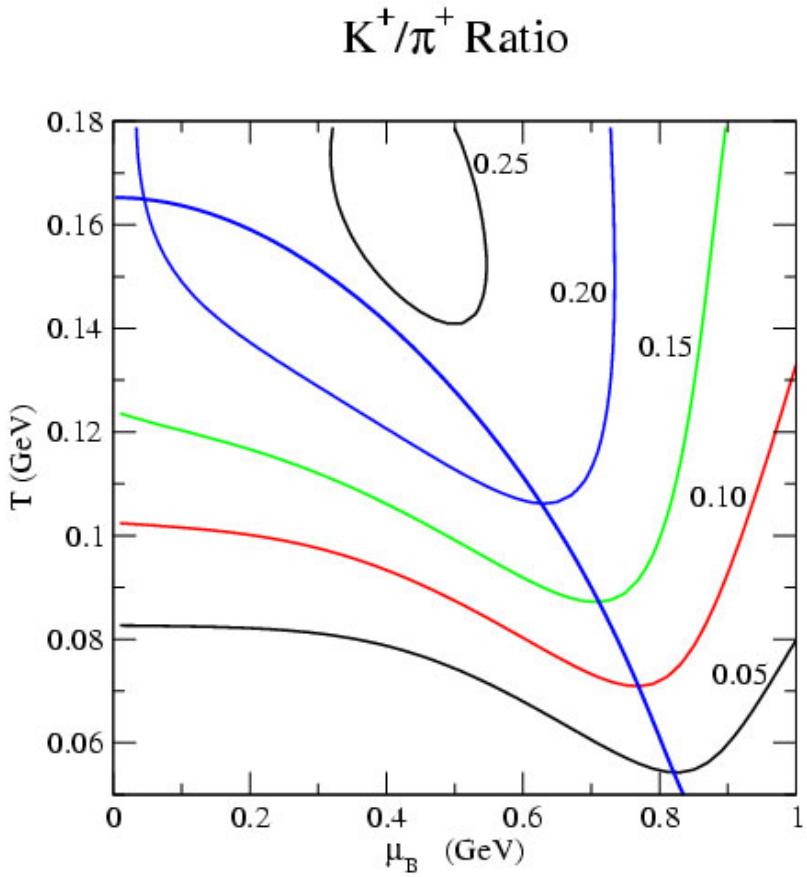
Hadron Multiplicities (S-QUARK CARRIERS)

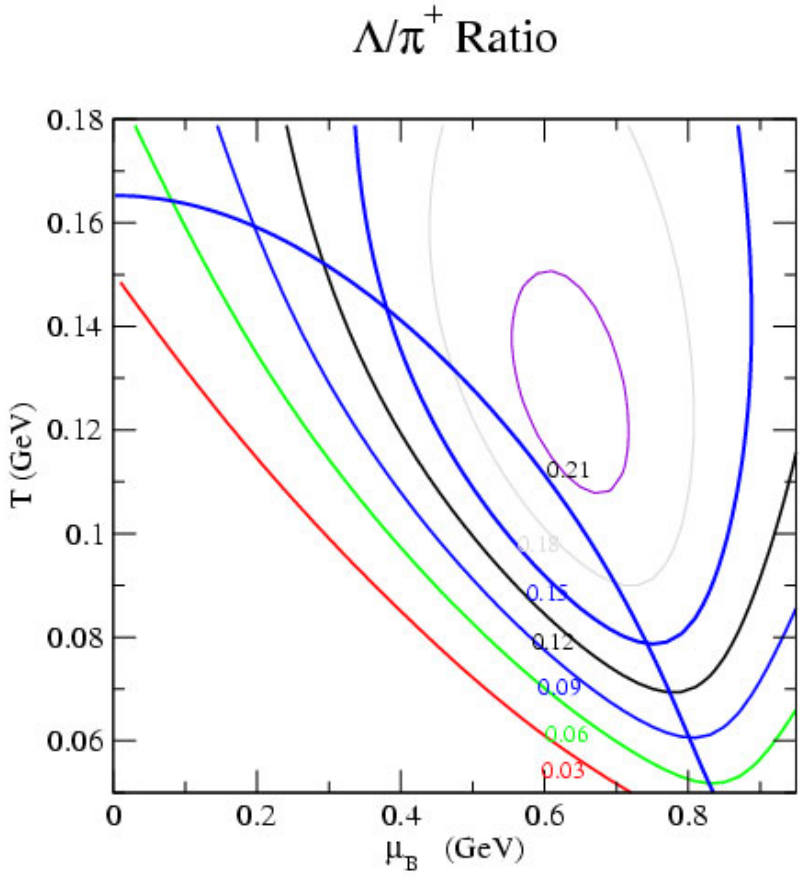


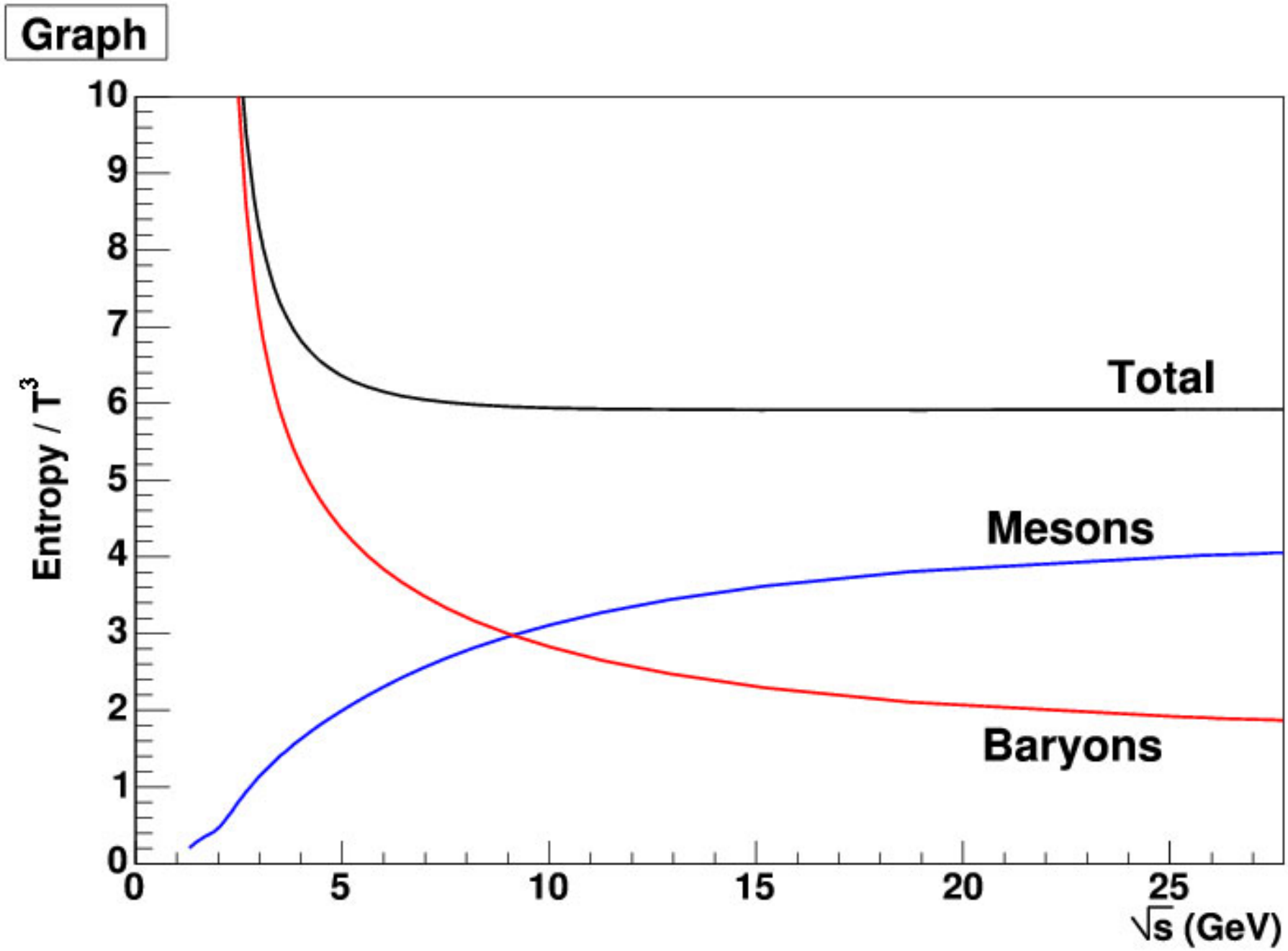


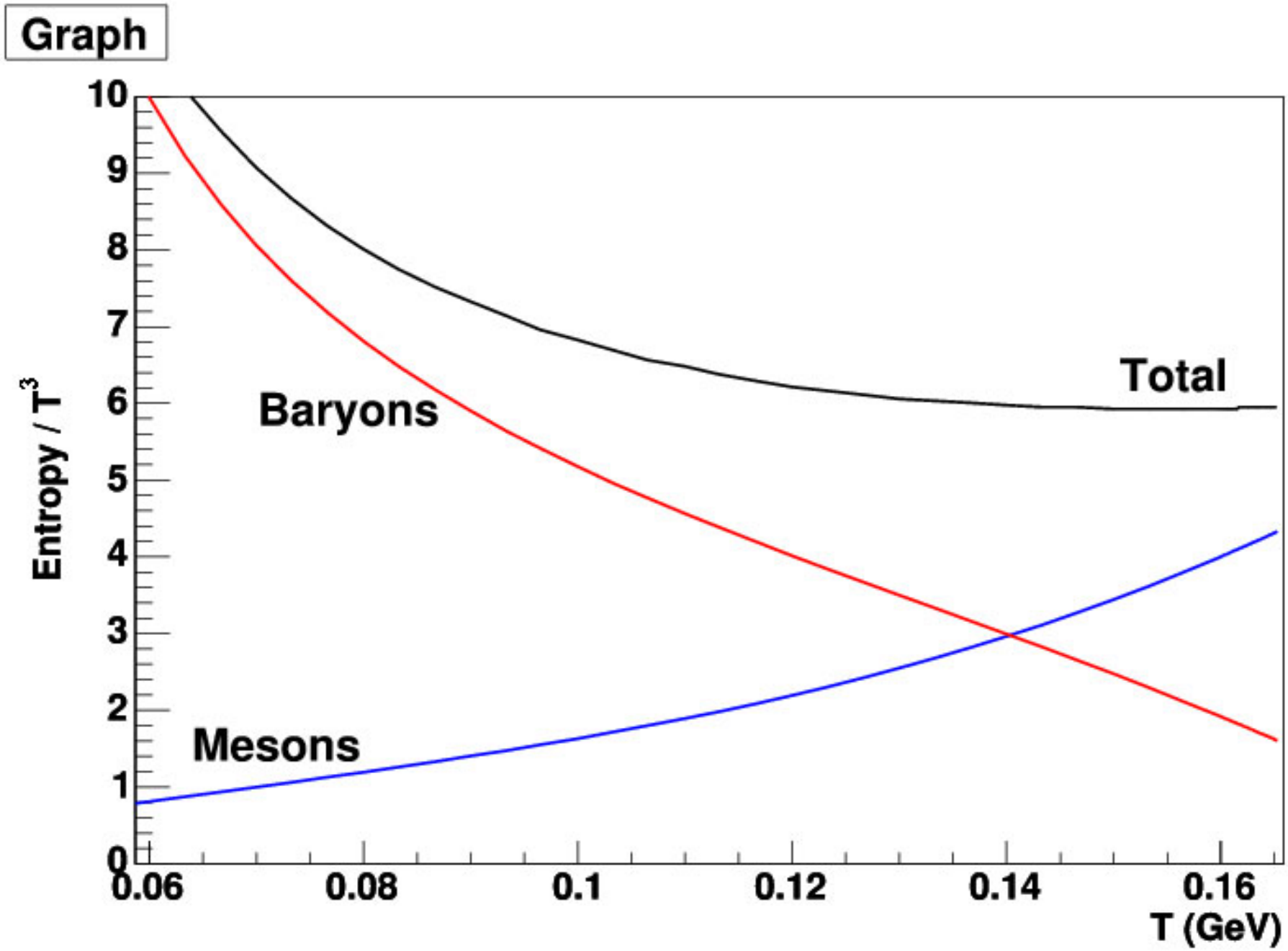
THE HORN

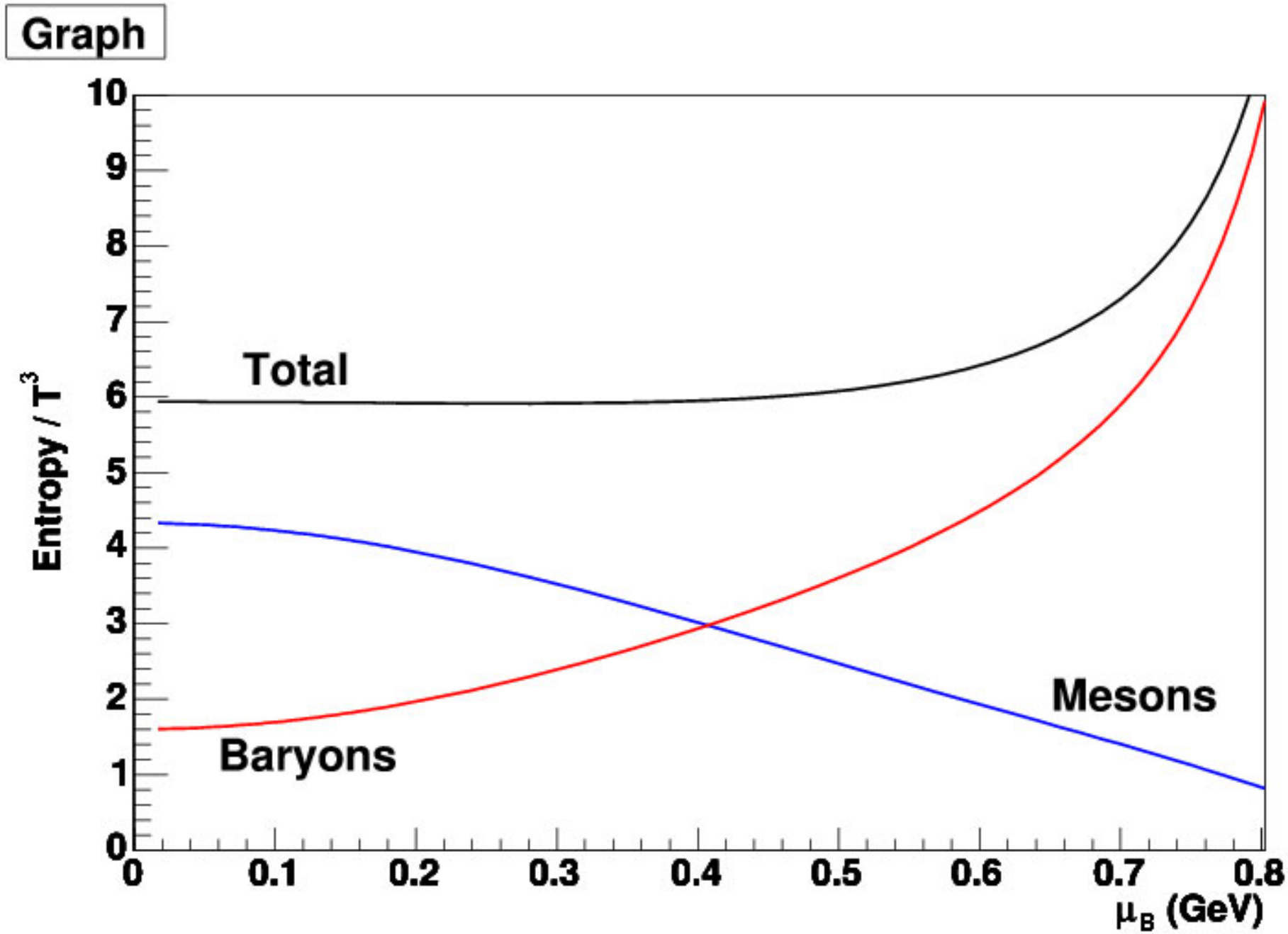

Wroblewski Factor
Freeze-out Curve
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.2
0.4
0.6
0.8
Temperature (GeV)
Chemical Potential μ_B (GeV)

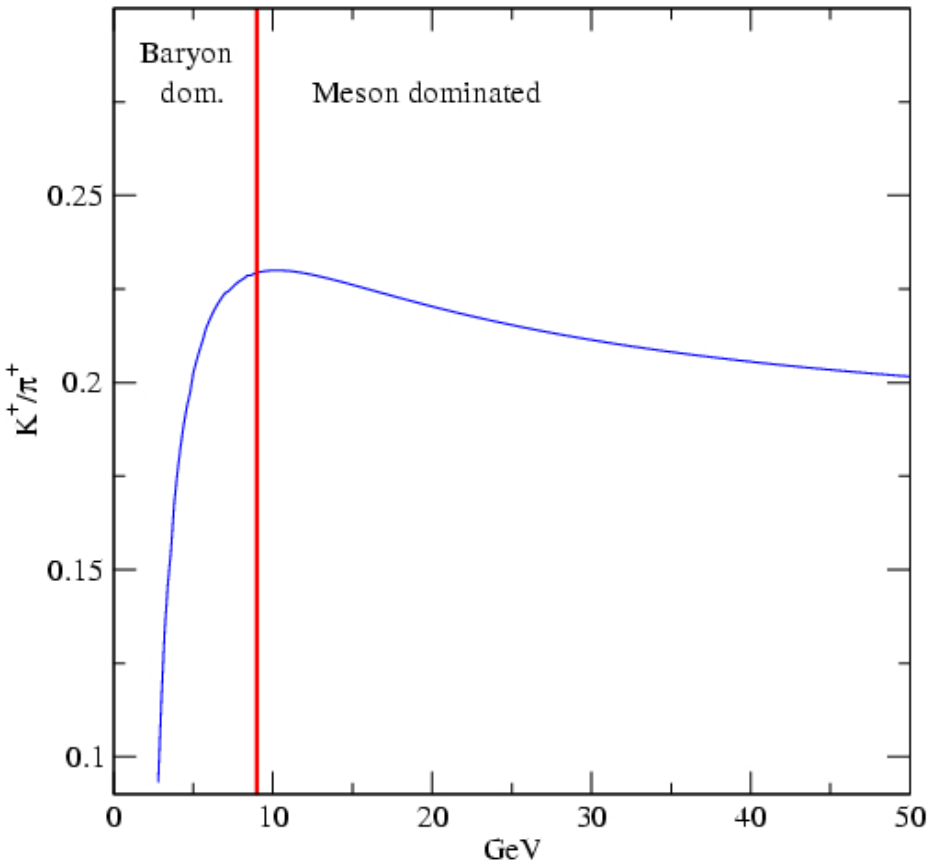

K^+/π^+ Ratio
0.18
0.16
0.14
0.12
0.1
0.08
0.06
T (GeV)
0.25
0.20
0.15
0.10
0.05
0
0.2
0.4
0.6
0.8
1
μ_B (GeV)

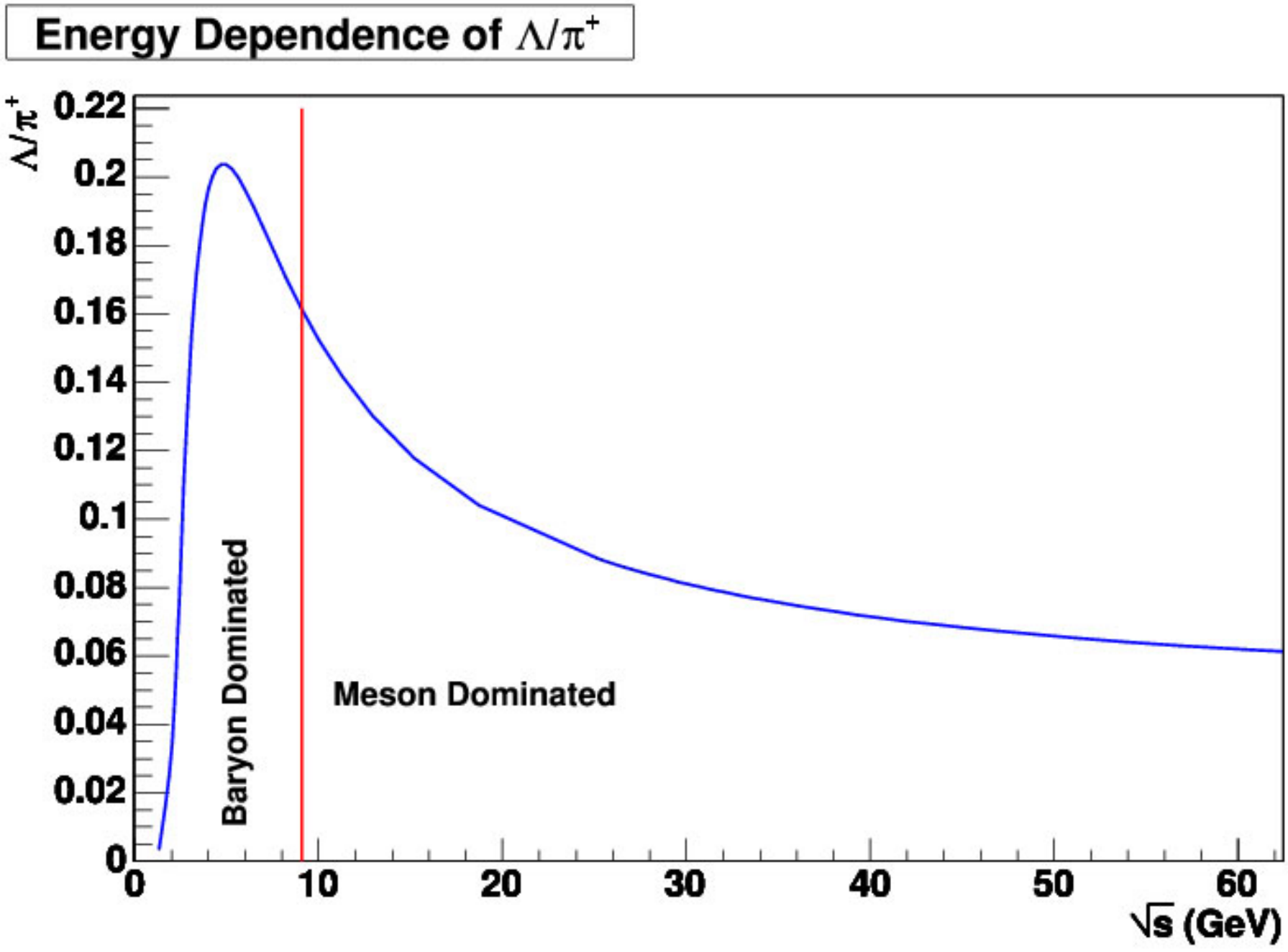

Λ/π+ Ratio
0.18
0.16
0.14
0.12
0.1
0.08
0.06
T (GeV)
0
0.2
0.4
0.6
0.8
μB (GeV)
0.21
0.18
0.15
0.12
0.09
0.06
0.03

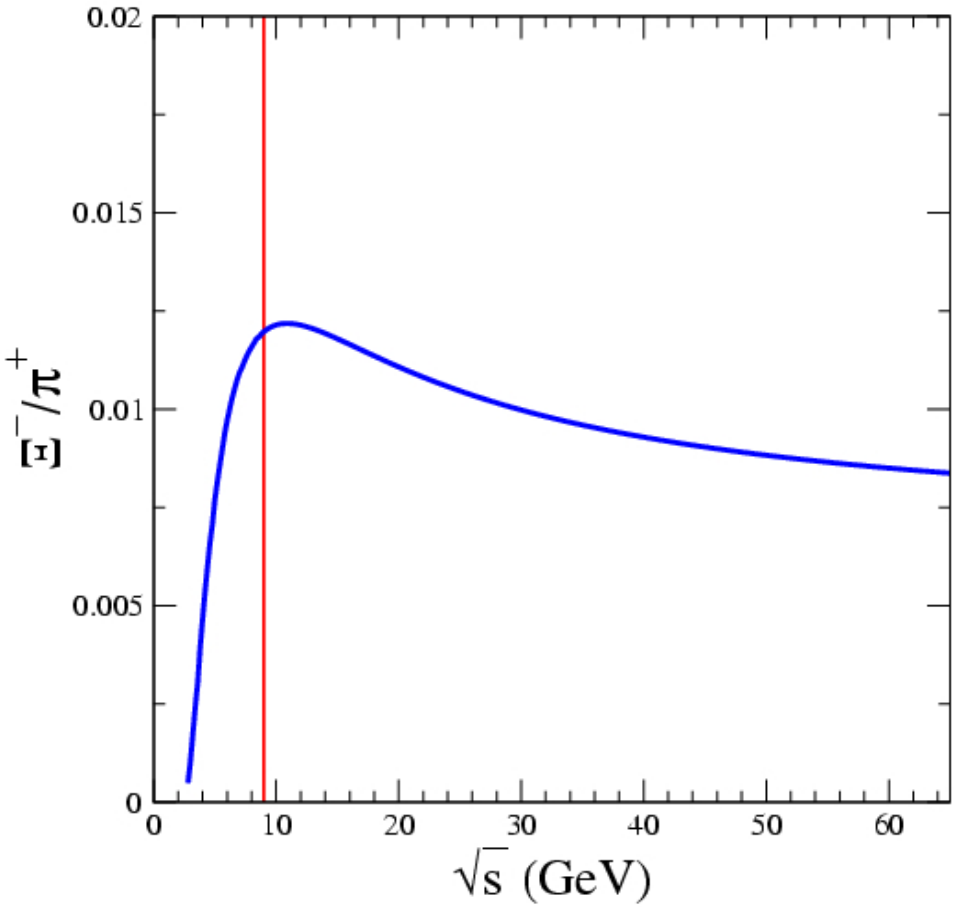

Graph
Entropy / T^3
√s (GeV)
Total
Mesons
Baryons
0
1
2
3
4
5
6
7
8
9
10
0
5
10
15
20
25

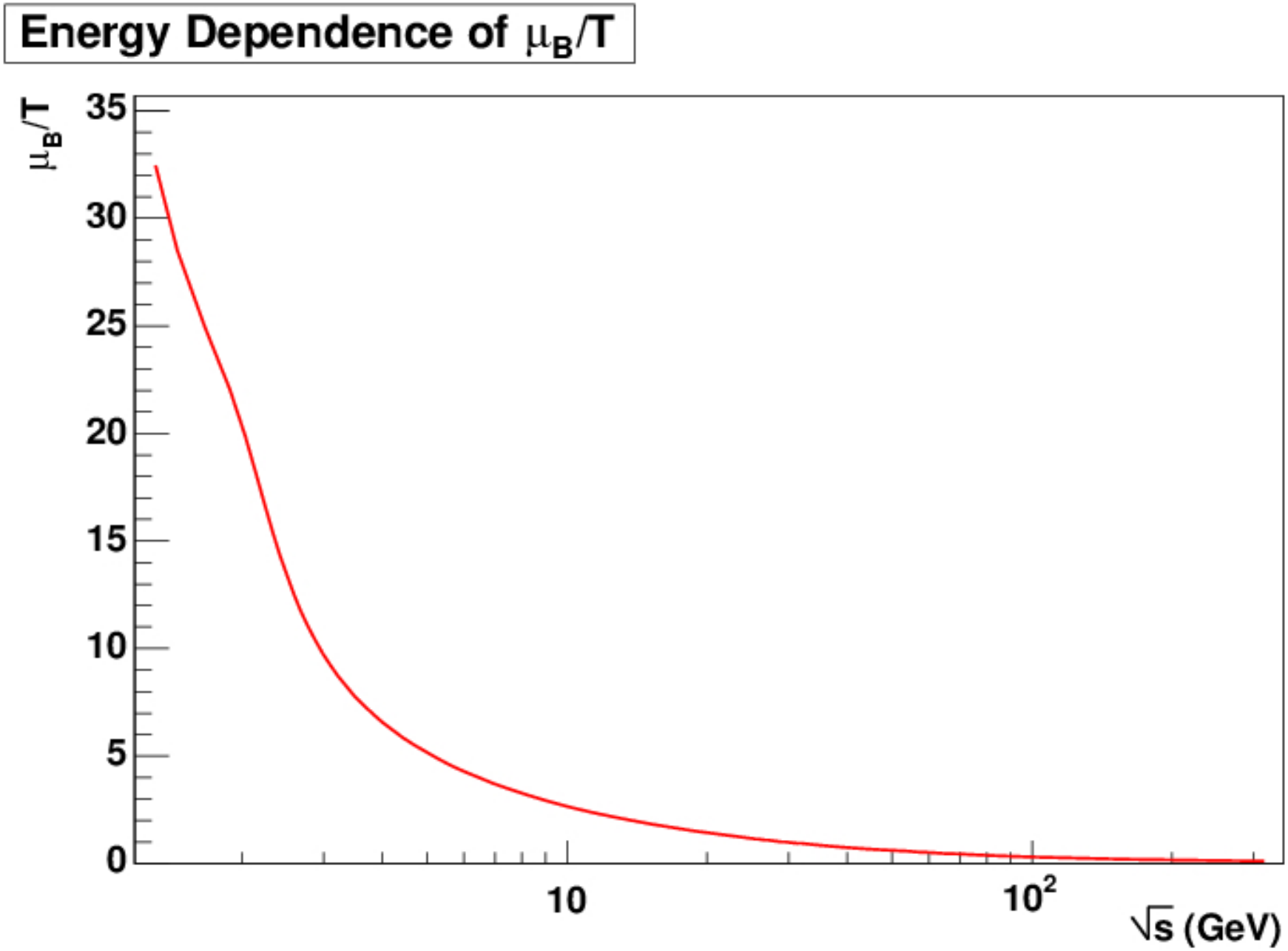

Graph
Entropy / T^3
T (GeV)
Total
Baryons
Mesons
0
1
2
3
4
5
6
7
8
9
10
0.06
0.08
0.1
0.12
0.14
0.16

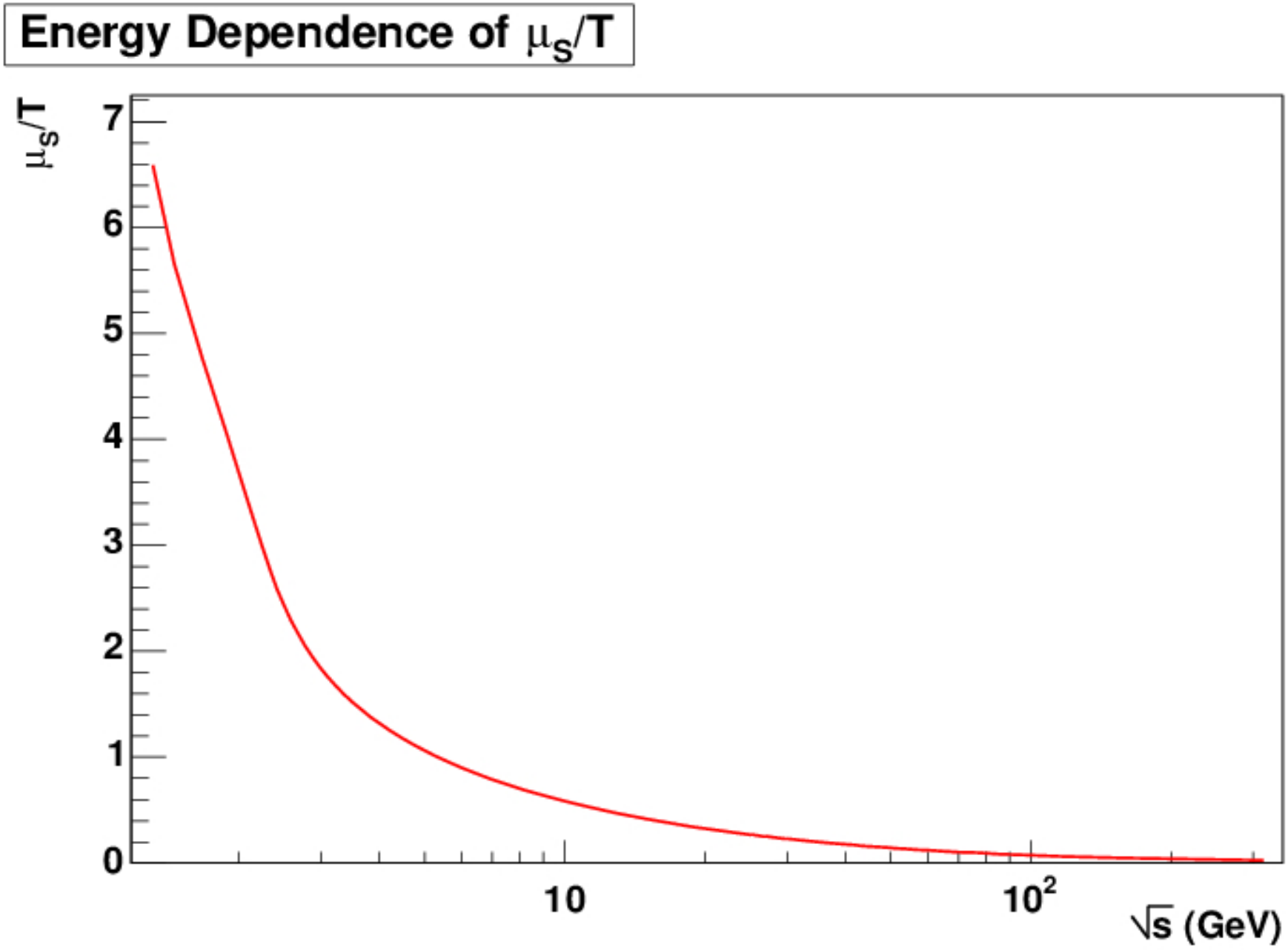

Graph
Entropy / T^3
Total
Baryons
Mesons
μB (GeV)
0
1
2
3
4
5
6
7
8
9
10
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8


Baryon
dom.
Meson dominated
0.25
0.2
0.15
0.1
K+/π+
0
10
20
30
40
50
GeV


Energy Dependence of Λ/π^+
Λ/π^+
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Baryon Dominated
Meson Dominated
0
10
20
30
40
50
60
$\sqrt{s}$ (GeV)


0.02
0.015
0.01
0.005
0
0
10
20
30
40
50
60
$\bar{\Xi}^-/\pi^+$
$\sqrt{s}$ (GeV)


Energy Dependence of μ_B/T
μ_B/T
35
30
25
20
15
10
5
0
10
10^2
$\sqrt{s}$ (GeV)


Energy Dependence of μ_s/T
μ_s/T
7
6
5
4
3
2
1
0
10
10^2
$\sqrt{s}$ (GeV)

Summary

Precise position of maxima is important.

Are all maxima at the same position or are there small differences?

Is it simply a change from a baryon dominated system to a meson dominated one?