Strange neutral hadron gas model

Assume chemical equilibrium state

⟶ strangeness partition function

$$\ln Z_s^{HG} = \frac{V_h T^3}{2\pi^2}\left[(\lambda_s \lambda_q^{-1} + \lambda_s^{-1}\lambda_q)\gamma_s F_K + (\lambda_s \lambda_q^{2} + \lambda_s^{-1}\lambda_q^{-2})\gamma_s F_Y + (\lambda_s^{2}\lambda_q + \lambda_s^{-2}\lambda_q^{-1})\gamma_s^2 F_\Xi + (\lambda_s^{3} + \lambda_s^{-3})\gamma_s^3 F_\Omega \right]$$

$\lambda_a = exp(\mu_a / T)$ $\quad$ γ_s : saturation factor

$F_K = \sum_j g_{Kj} (m_{Kj}/T)^2 K_2(m_{Kj}/T)$, $\quad$ $Kj = K, K^*, \ldots$ m ≤ 1780 MeV

$Yj = \Lambda, \Sigma, \ldots$ $\quad$ m ≤ 1940 MeV

$\Xi j = \Xi, \Xi(1530), \ldots$ $\quad$ m ≤ 1950 MeV

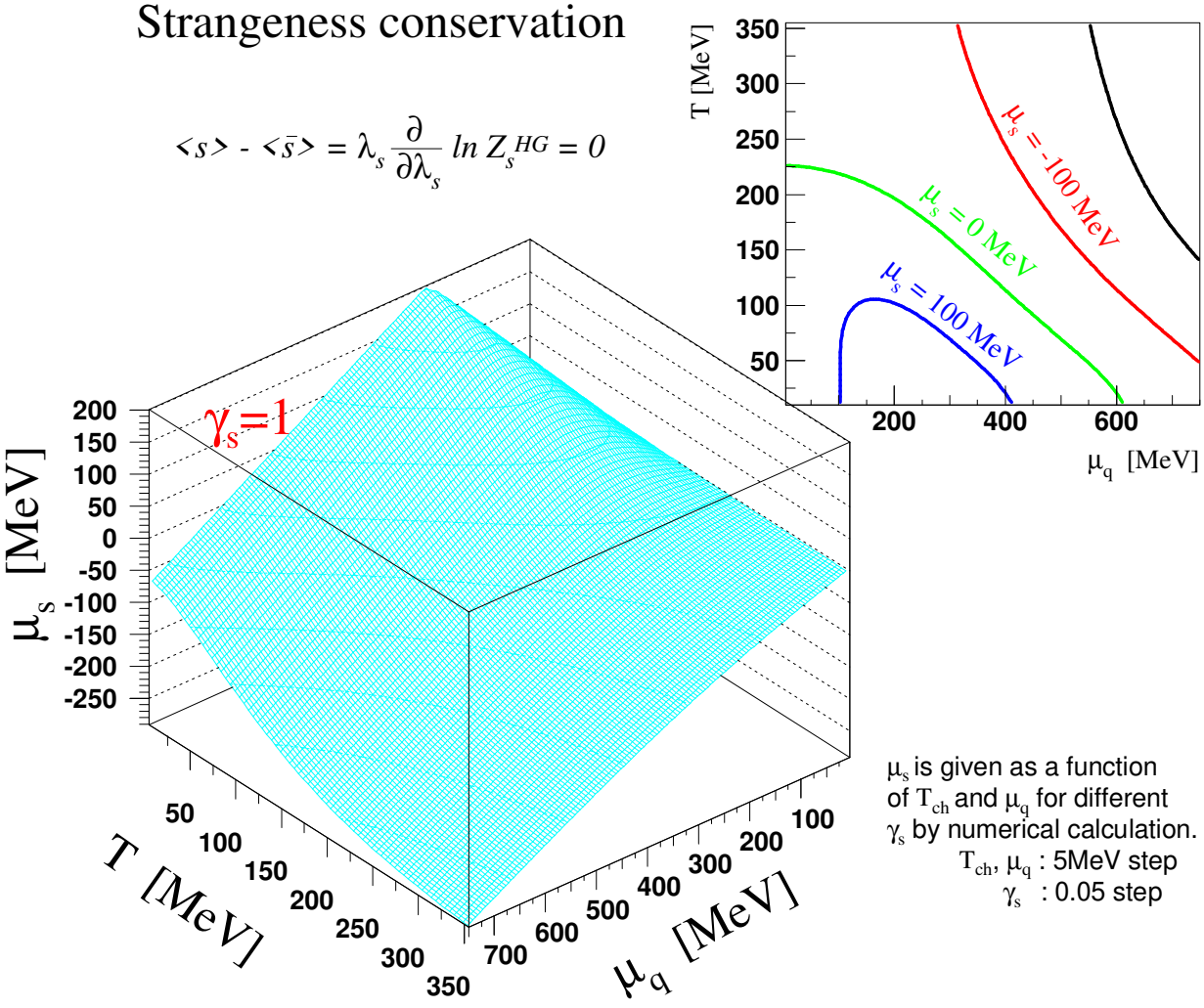
$\Omega j = \Omega, \Omega(2250)$

g : spin-isospin degeneracy factor

(This formation is referred from Phys. Rev. D51 3408 (1995) J Letessier et al)

Strangeness conservation

$$\langle s \rangle - \langle \bar{s} \rangle = \lambda_s \frac{\partial}{\partial \lambda_s} \ln Z_s^{HG} = 0$$



μ_s is given as a function of T_{ch} and μ_q for different γ_s by numerical calculation.

T_{ch}, μ_q : 5MeV step

γ_s : 0.05 step