

Thermal-Fist

The screenshot displays the Thermal-Fist software interface, which is used for fitting experimental data to a thermal model. The interface is divided into three main sections, each highlighted with a red box and a number:

- 1. Data to fit:** A table listing experimental data points for various particles. The table has columns for Name, Fit?, Exp. value, Exp. error, Model value, Deviation, Data/Model, and Feeddow. The data points are for pi+, pi-, K+, K-, p, anti-p, Lambda, and anti-Lambda.
- 2. HRG model configuration:** A panel for configuring the HRG model. It includes options for Model (Ideal), Ensemble (Canonical), Statistics (Boltzmann/Quantum), Resonance widths (Zero-width), and Fit parameters (T, R, yQ, yS).
- 3. Thermal model configuration:** A panel for configuring the thermal model. It includes options for Conservation laws (Constrain μ_Q , μ_S , μ_C) and Mixed-canonical ensemble (Canonical treatment of baryon number, electric charge, strangeness).

The interface also includes a menu bar (File, View, Help), a status bar (© 2014-2020 Volodymyr Vovchenko), and various buttons for loading data, performing fits, and saving results.

Part 1:
set experimental data, feed-down source
(we use hadrons only)

Part2/3:
Model configuration

Model: ideal gas (the only option for CE)
Ensemble: CE/GCE
Statistics: Boltzmann/Quantum
(Resonance Width)

Conservation laws:
Correlation Volume(V_c)
Number of conserved charges in V_c

Thermal-Fist in Isobar

Default configuration:

Ideal gas model

CE(for BS)

Boltzmann statistics

T fixed at 155 MeV

gamma_q fixed at 1

Vc/V fixed at 1

Number of conserved charges:

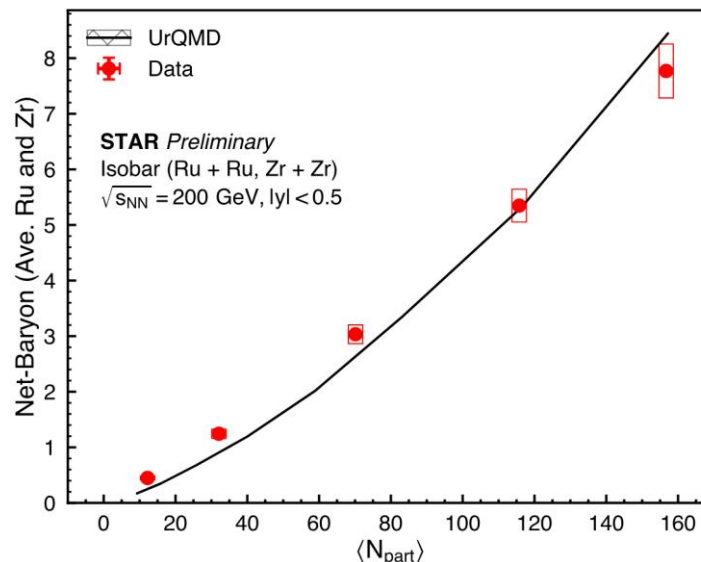
S=0

net-B	0-10%	10-20%	20-40%	40-80%
(within V)	7	5	3	1
Npart	156.675	115.75	70.075	22.156

Two consistent ways:

1) Refer to the baryon stopping measurement

2) Use 0-10% GCE fit to extract net-B number → Scale to other centralities with Npart



T = 155 MeV
muB = 24.5982 MeV
muS = 4.95871 MeV
muQ = -0.354968 MeV
gammaq = 1
gammaS = 0.997641
V = 986.888 fm³

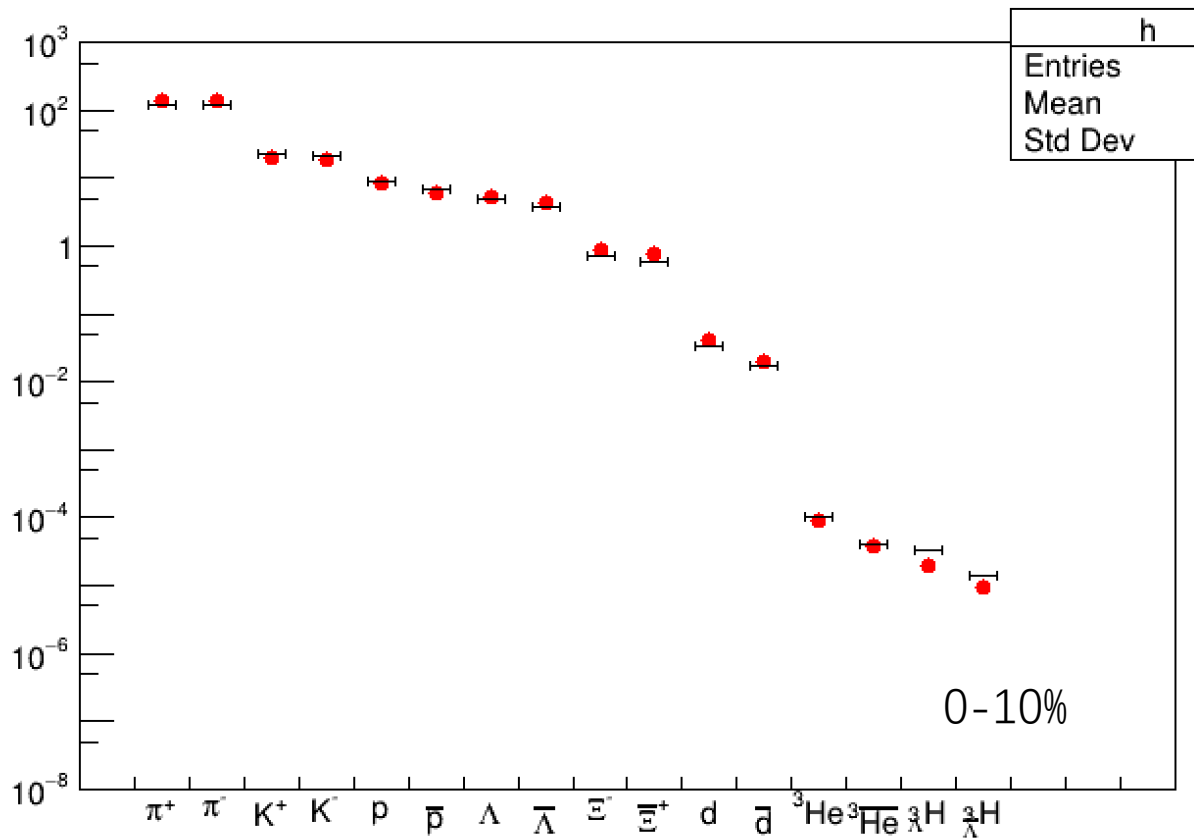
Particle density = 0.328393 fm⁻³
Net baryon density = 0.00700232 fm⁻³
Net baryon number = 6.91051
Net electric charge = 3.10973
Net strangeness = 2.14604e-14
E/N = 0.948813
S/B = 333.859
Q/B = 0.45
S/|S| = 1.79869e-16

chi2/ndf = 23.6924/7 = 3.38462

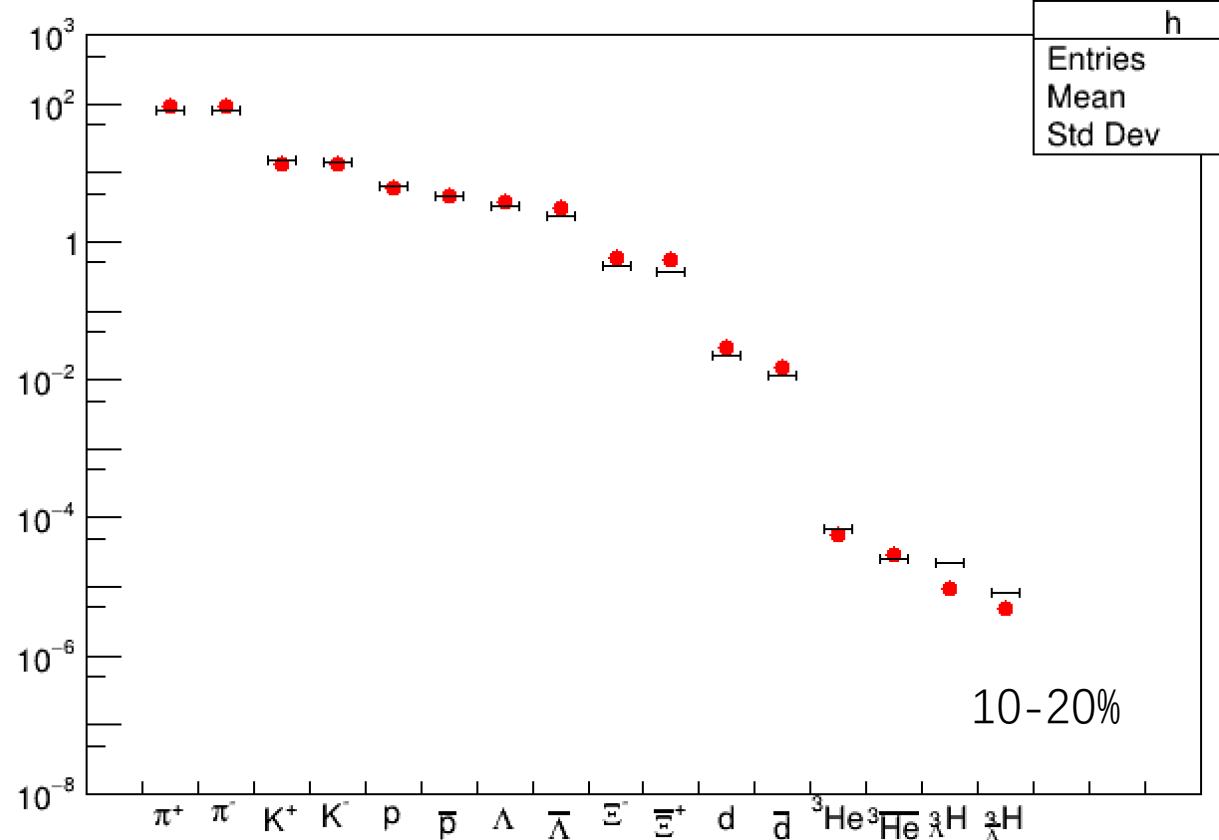
Model accuracy = (14.60 ± 8.30) %

Calculation time = 93 ms

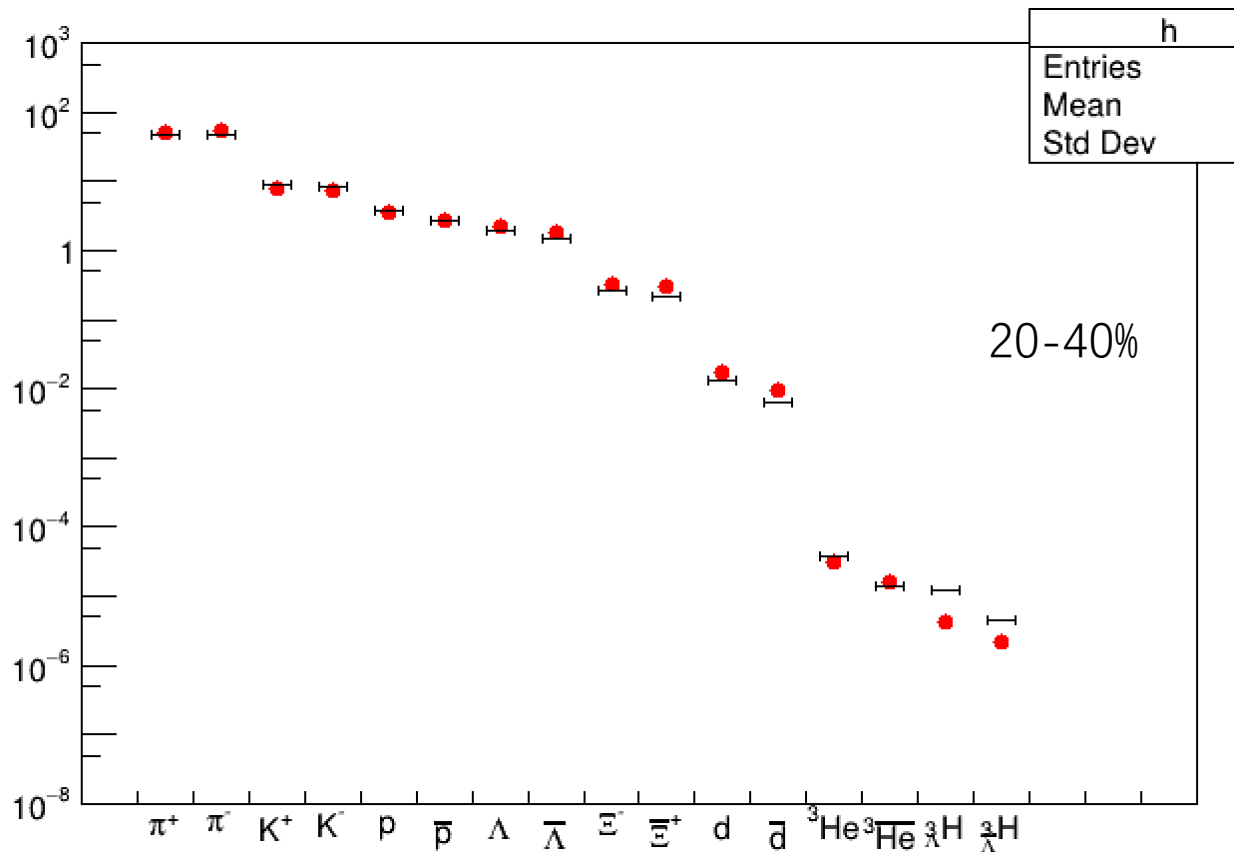
Thermal-Fist in Isobar



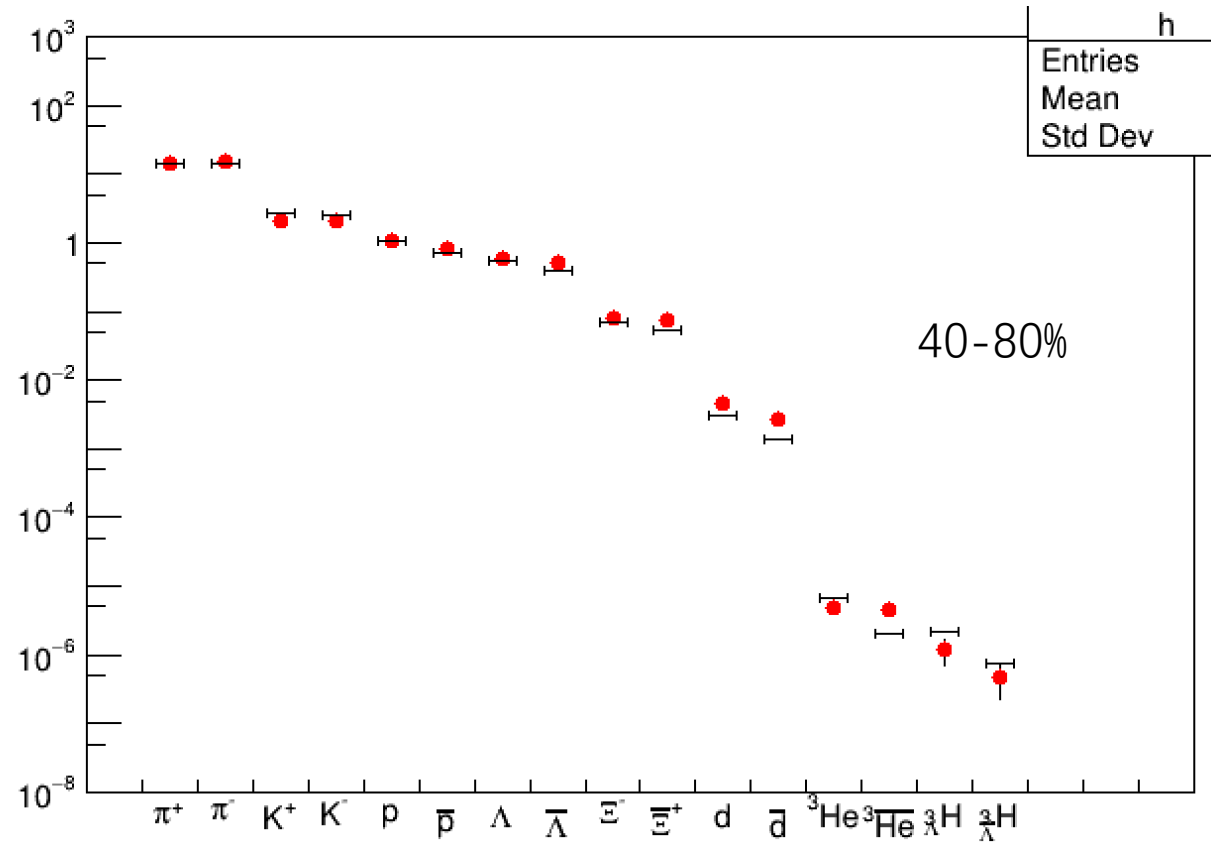
Default configuration



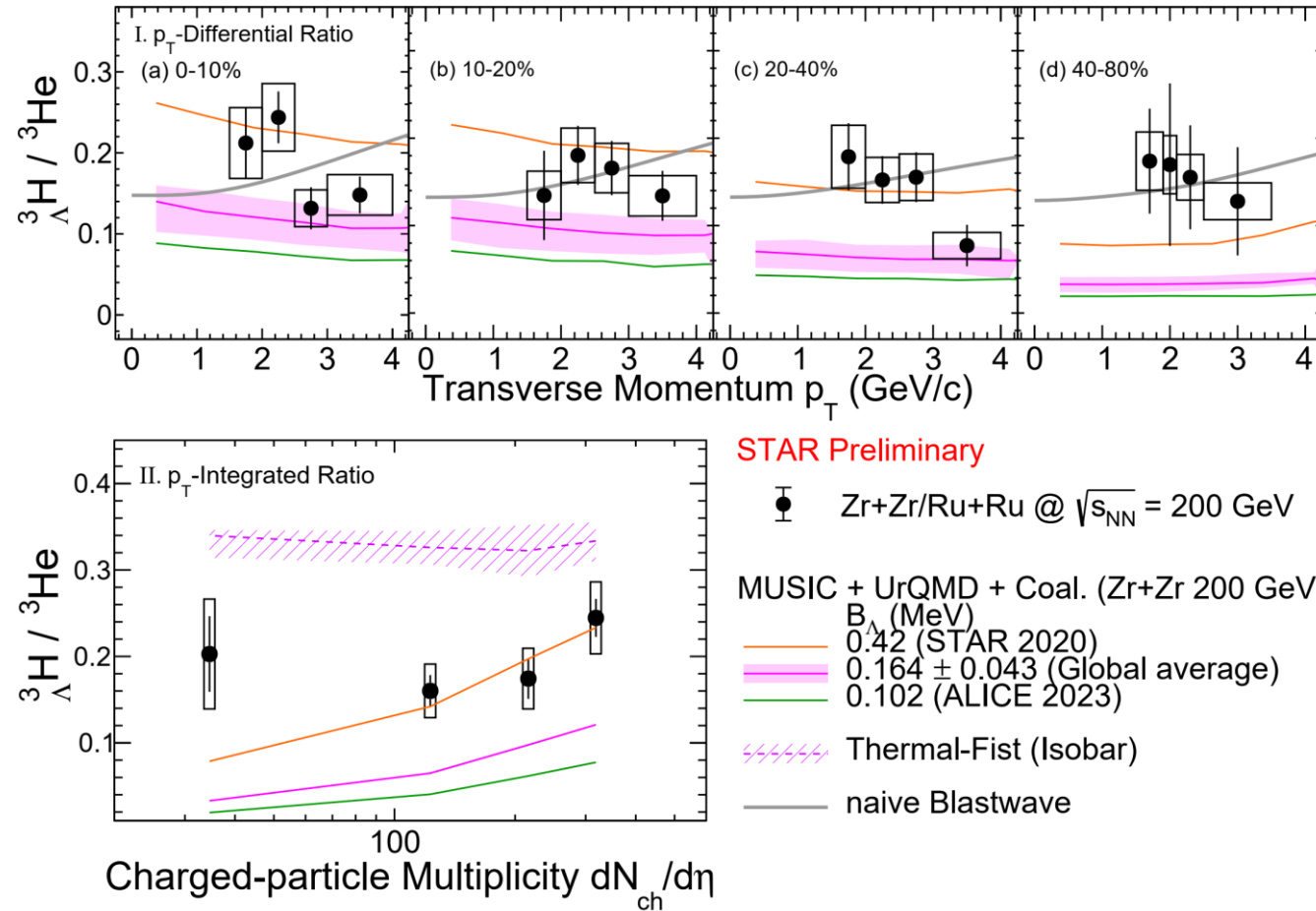
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Default configuration



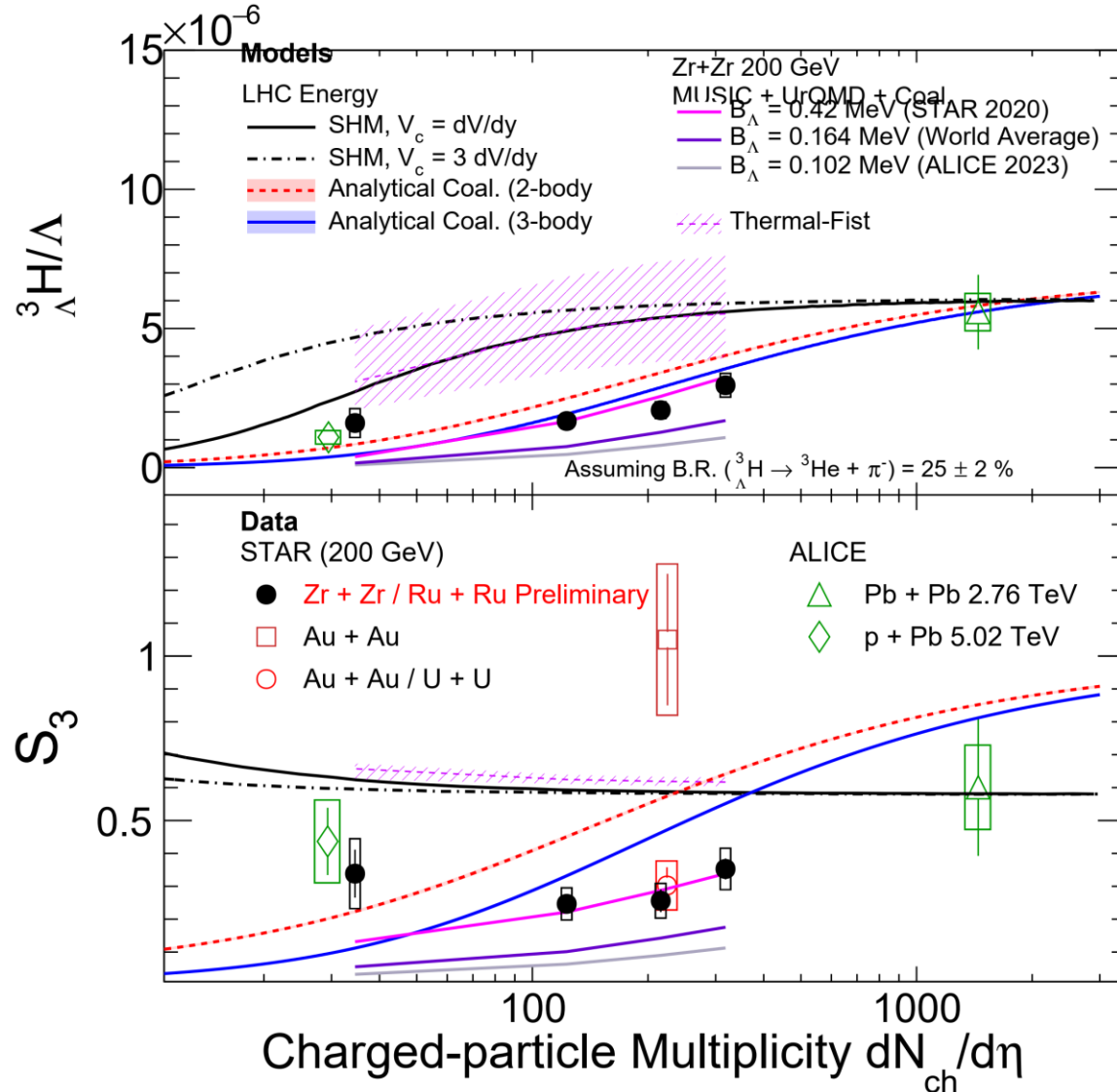
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Error band come from different model configuration:

- Statistics (**classic**/quantum)
- T (fixed at 150/**155**/160)
- V_c/V (fixed at 1/3, or free)

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