Pioneering Years: with Grazyna Odyniec at the Bevalac and SPS

Reinhard Stock
The Streamer Chamber Collaboration at LBL 1983
Historic Streamer Chamber Data

$^{40}$Ar+KCl
1.8 AGeV

The Goal:
EOS of Hadronic Matter
EOS Observables: sensitivity to high density stage

J. W. Harris & R. Stock
Notas de Fisica (1984)
Grazyna at Rio de Janeiro 1993
Howel Pugh
Transverse Momentum Balancing

EOS Observables: directed Flow ($v_1$)

Ar + KCl
Str.Ch.

La + La
Pl. Ball

K.G.R. Doss et al
PRL 57 (1986) 302
EOS from Sideflow Data

\[ F(y) = P_{eff} \times S \times t_{pass} \]

EOS

A long story since 1989!
Softest Point of the EOS

10-40% Centrality

a) antiproton

b) proton

\[ \frac{dv}{dy} \]

\[ \sqrt{s_{NN}} \text{ (GeV)} \]

H. Stöcker 2005

STAR

PRL 112 (2014) 162301
Hydrostatic equilibrium:
The inward pressure by gravity of each sphere-shell at radius R is counterbalanced by the EOS-compressional counter-force of the enclosed interior

Constraining the nuclear matter equation of state around twice saturation density

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Abstract
Using FOPI data on elliptic flow in Au+Au collisions between 0.4 and 1.5A GeV we extract constraints for the equation of state (EOS) of compressed symmetric nuclear matter using the transport code IQMD by introducing an observable describing the evolution of the size of the elliptic flow as a function of rapidity. This observable is sensitive to the nuclear EOS and a robust tool to constrain the compressibility of nuclear matter up to 2 \( \rho_0 \).
EOS in Neutron Stars

A. Le Fèvre, Y. Leifels, W. Reisdorf, J. Aichelin, Ch. Hartnack

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