Differential neutron-proton squeeze-out

W. Trautmann, GSI Darmstadt

B.A. Brown, PRL 85 (2000)

18 Skyrme forces which fit the $^{132}\text{Sn}$-$^{100}\text{Sn}$ mass difference; FP (dots) is variational with v14 potential (1981)

the symmetry energy at high density ??
probes of high-density stage?

Bao-An Li, PRL 88, 192701 (2002)

differential neutron-proton flow
can LAND be used to measure differential neutron/proton flow?

S254 analysis by J. Brzychczyk, P. Pawlowski

neutron and proton detection
excitation functions of flow

elliptic flow $v_2$

sideways flow $dv_1/dy$

$^{197}$Au + $^{197}$Au,
data from INDRA, FOPI, AGS experiments

new technique of correcting:
J. Łukasik and W.T., Proc. IWM2005
A. Andronic et al., EPJ A 30 (2006)
idea discussed at several occasions

FOPI days in Split 2005
LAND Collaboration Meeting 2006
CHIMERA-GSI workshop 2006
FOPI collaboration meeting 2007
Asy-EOS workshop in Catania 2008

Letter of Intent subm. Spring 2008
Proposal in preparation
for experiments at SIS and FAIR
differential elliptic flow

Q.F. Li and P. Russotto

UrQMD vs. FOPI data:
Au+Au @ 400 A MeV

stiff

inversion of neutron
and hydrogen flows

soft

squeeze-out more
sensitive than the
directed flow
differential elliptic flow

Q.F. Li and P. Russotto

inversion survives acceptance cuts of FOPI/LAND experiment
FOPI/LAND experiment on neutron squeeze out

Au+Au 400 A MeV

Y. Leifels et al., PRL 71, 963 (1993)
elliptic flow

preliminary result
\[ \gamma = 0.6 \pm 0.3 \]

the present limit is given by the statistics
test of cluster algorithm

Z distribution (in arbitrary units) of charged particles in Au+Au at 400 AMeV central collisions (arbitrarily normalized at Z=1)
isospin diffusion

preliminary result
\( \gamma = 0.6 \pm 0.3 \)

\[
E_{\text{sym}}/A = a_4 + L/(\rho - \rho_0/\rho_0)/3 + K_{\text{asy}}(\rho - \rho_0/\rho_0)^2/18
\]

Chen, Ko and Li, PRL 94, 032701 (2005)
the goal: to achieve consistency for neutron stars
3x10^{+30} \text{ kg}

heavy-ion reactions

3x10^{-25} \text{ kg}

neutron skins

from ISF white paper (MSU-NSCL)
Letter of Intent 2008

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