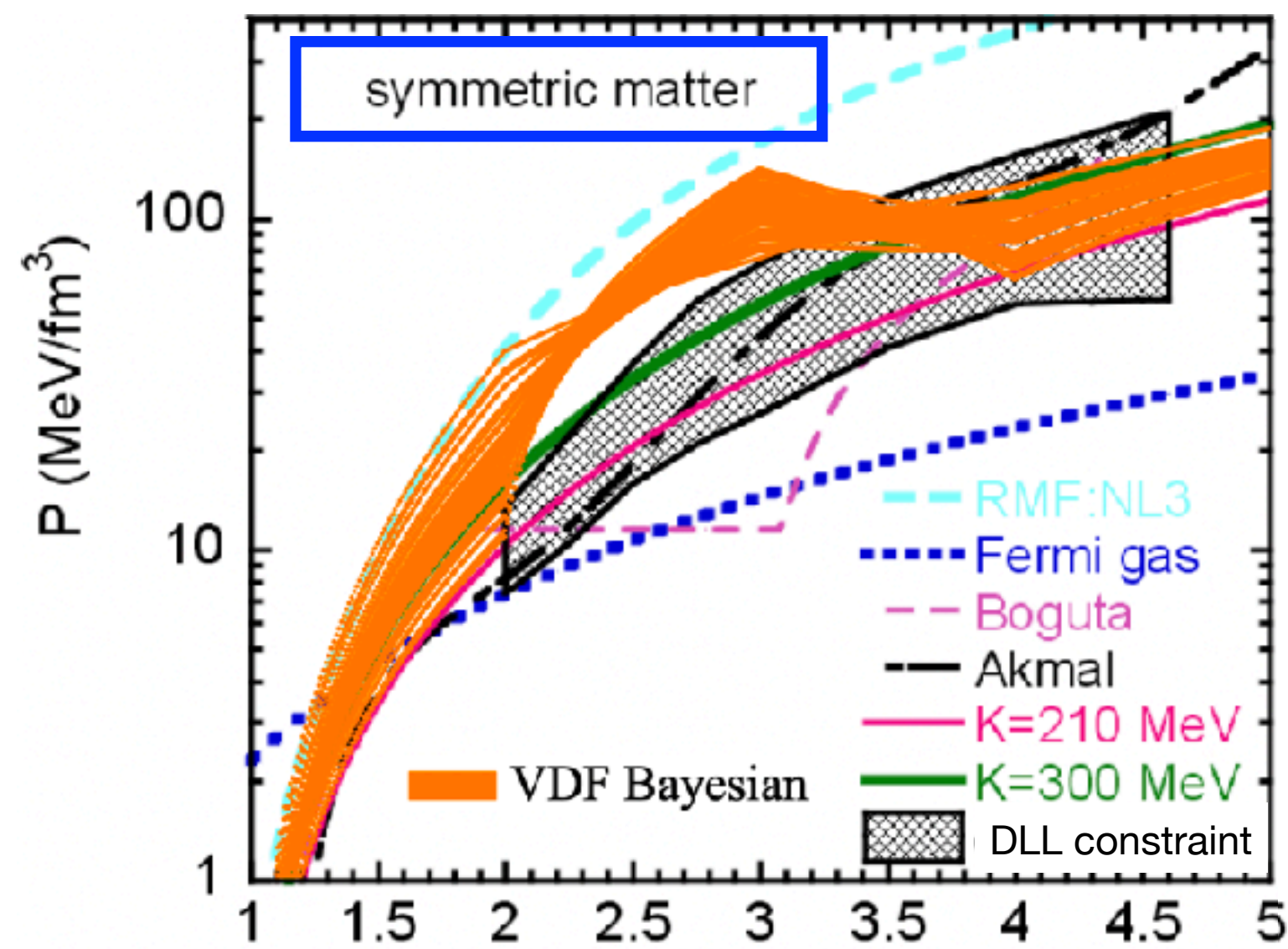


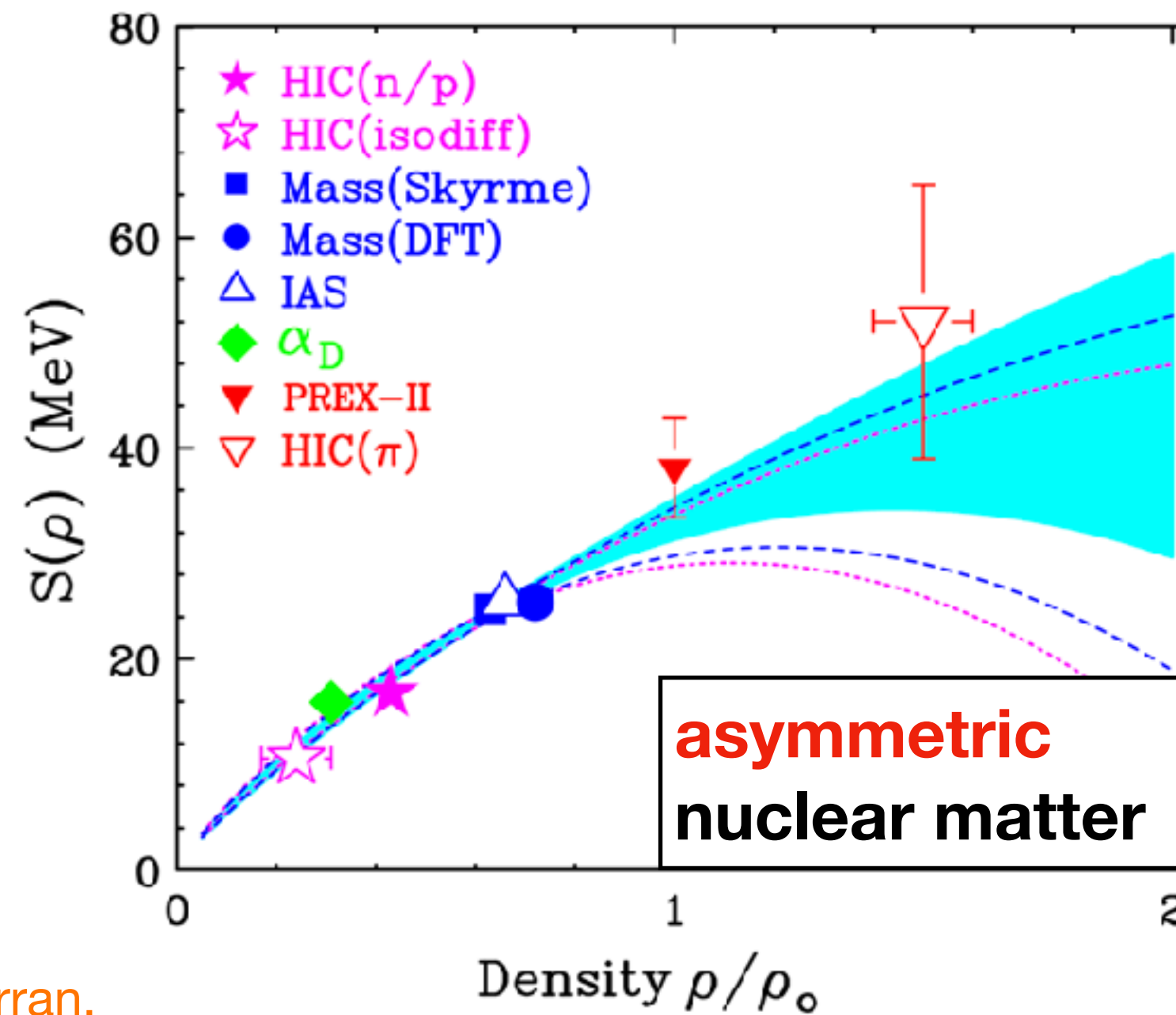
Hadronic transport: Exploring dense nuclear matter from RHIC to FRIB400

- Heather Crawford’s talk on “Experimental studies of nuclei – structure and reactions”:
“*heavy-ion collisions are a way to **constrain the symmetry energy***”
- Thomas Glasmacher’s talk on “FRIB status and the path forward”:
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Danielewicz, Lacey, Lynch, *Science* **298**,1592–1596 (2002) ρ/ρ_0
 Oliinychenko, AS, Koch, McLerran, *arXiv:2208.11996*

(here: VDF Bayesian result superimposed on the DLL plot for an easy comparison)



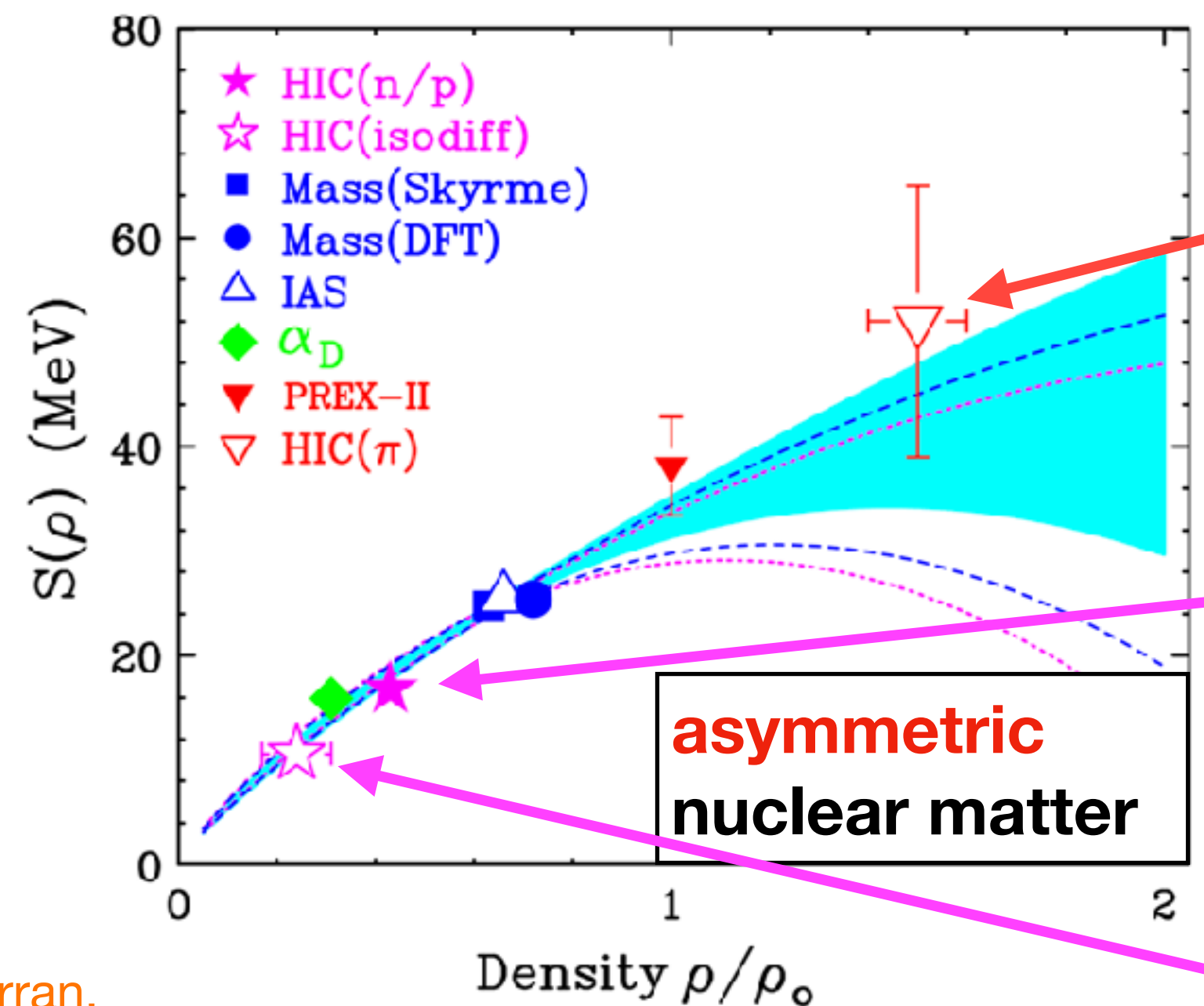
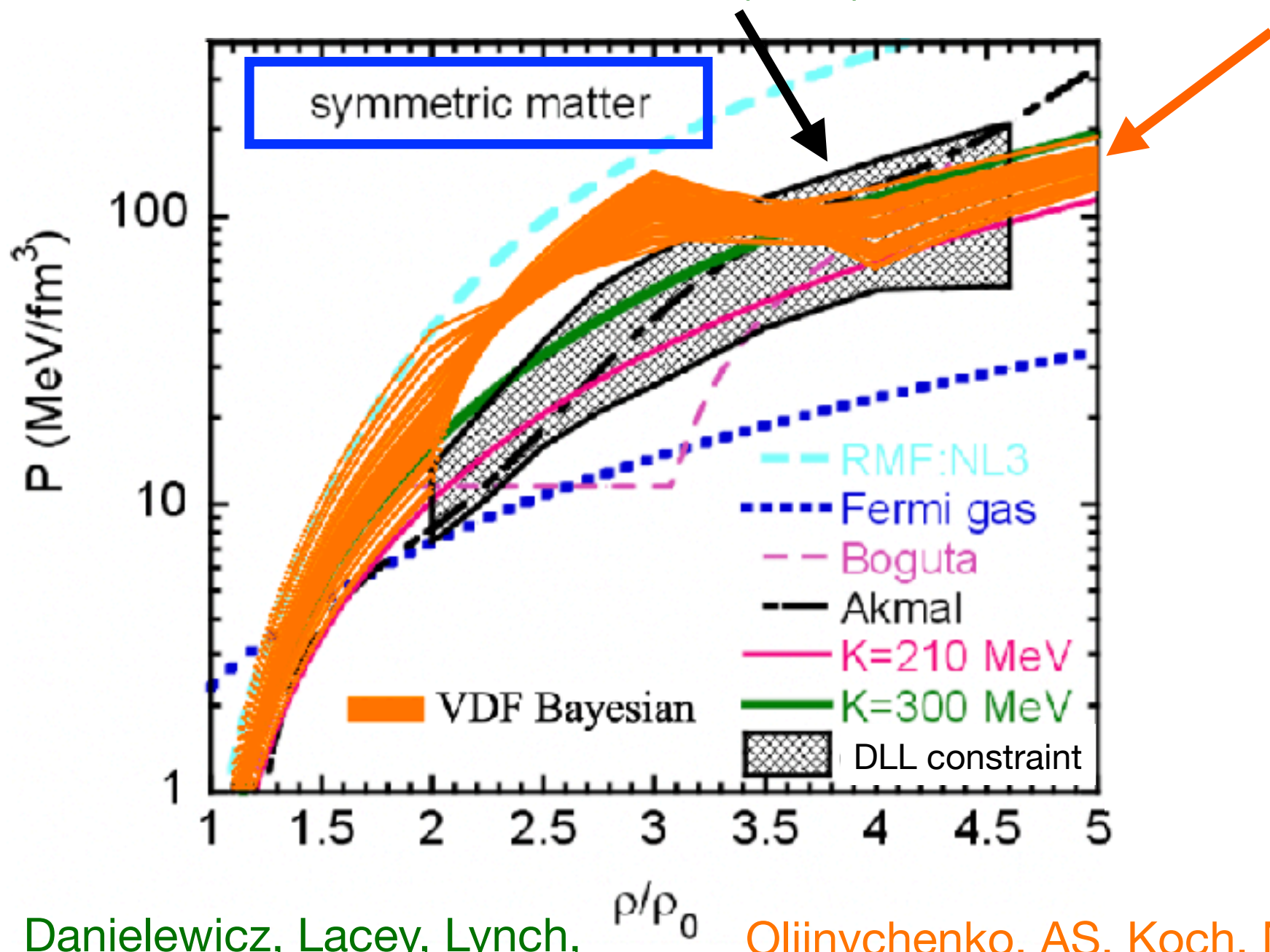
Lynch, Tsang, *Phys. Lett. B* **830**,137098 (2022)

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197Au+197Au @ 0.15–10 GeV/u
model used: pBUU
Danielewicz, Lacey, Lynch,
Science **298**,1592–1596 (2002)

197Au+197Au @ 2.9–9.0 GeV/u
model used: SMASH w/ VDF potentials
Oliinychenko, AS, Koch, McLerran,
arXiv:2208.11996



Danielewicz, Lacey, Lynch,
Science **298**,1592–1596 (2002)

Oliinychenko, AS, Koch, McLerran,
arXiv:2208.11996

(here: VDF Bayesian result superimposed on the DLL plot for an easy comparison)

132 Sn, 124 Sn, 112 Sn, and 108 Sn @ 270 MeV/u
model used: dcQMD
S π RIT Collaboration,
Phys. Rev. Lett. **126**, 16, 162701 (2021)

112Sn+112Sn, 124Sn+124Sn @ 120 MeV/u
model used: ImQMD
Zhang, Tsang, Li, Liu, Hang,
Phys. Lett. B **732**,186–190 (2014)

112Sn+112Sn, 124Sn+124Sn @ 50 MeV/u
model used: ImQMD05
Zhang, Danielewicz, Famiano, Li, Lynch, Tsang, Li,
Phys. Lett. B **664**,145–148 (2008)

Lynch, Tsang, Phys. Lett. B **830**,137098 (2022)

Hadronic transport: Exploring dense nuclear matter from RHIC to FRIB400

- Development of hadronic transport codes is *not complete*: further improvements are needed, e.g., (parametrizable) momentum-dependence of potentials, isospin-dependence, ...
- Continued research in hadronic transport needed to answer many of the questions probed by:
FXT BES-II (now) FRIB (now) HADES (now) CBM (in ~5-10 yrs) FRIB400 (in ~5-10 yrs?)
- US PIs with expertise in hadronic transport theory research (*to the best of my knowledge*):
 - members of the TMEP collaboration: Paweł Danielewicz, Che Ming Ko, Bao-An Li, Betty Tsang, Bill Lynch
 - Volker Koch, Steffen Bass, Zi-Wei Lin
(emeritus positions: Jørgen Randrup, George Bertsch)

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 - [Volker Koch](#), [Steffen Bass](#), [Zi-Wei Lin](#)
(emeritus positions: [Jørgen Randrup](#), [George Bertsch](#))
- **Without support for this research, much of the US hadronic transport expertise will be lost in the near future**

- **A research program for hadronic transport studies of the dense nuclear matter EOS is needed to understand results from low- to medium-energy heavy-ion collisions**
- **Support for the hadronic transport community is needed to maintain the expertise between BES-II and FRIB400**
- **White paper: “Baryonic Equation of State from Astronomy observations and terrestrial experiments” — email amsorens@uw.edu if you’re interested!**