

NS WORKING GROUP

Veronica Dexheimer

Convenor: Veronica Dexheimer (co-PI)

Nicolas Yunes (PI), Jorge Noronha (co-PI), Jacquelyn Noronha-Hostler (co-PI), Claudia Ratti (co-PI)

Gordon Baym (Sr. Investigator), Jeremy Holt (Sr. Investigator), Andrew Steiner (Sr. Investigator), Elias Most (Sr. Investigator), Roland Haas (Sr. Investigator)

Toru Kojo (Ext. Collaborator), Hajime Togashi (Ext. Collaborator), Michael Strickland (Ext. Collaborator), Debarati Chatterjee (Ext. Collaborator), Cole Miller (Ext. Collaborator), Frederick Lamb (Ext. Collaborator), Tetsuo Hatsuda (Ext. Collaborator), Mark Alford (Ext. Collaborator), Phil Landry (Ext. Collaborator), Katerina Chatziioannou (Ext. Collaborator), Constanca Providencia (Ext. Collaborator)

Israel Portillo Vazquez (Lecturer), Jeffrey Peterson (PhD student Dexheimer), Nikolas Camacho Cruz (PhD student Noronha-Hostler), Jamie Karthein (PhD student Ratti), Joaquin Grefa (PhD student Ratti), Angel Nava Acuna (PhD student Ratti), Michael Kahangirwe (PhD student Ratti), Mauricio Hippert (Postdoc Noronha), Hung Tan (PhD student Yunes), Carlos Conde (PhD student Yunes), Rajesh Kumar (Postdoc Dexheimer), Nanxi Yao (PhD student Noronha-Hostler), Debora Mroczek (PhD student Noronha-Hostler), Ziyuan Zhang (PhD student Alford), Nicolas Patino (PhD student Yunes), Pengsheng Wen (PhD student Holt), Carl-Johan Haster (Postdoc), Anik, Hasan (PhD student Steiner), Lin, Zidu (Postdoc Steiner), Hitansh Shah (PhD student Ratti), David Friedenber (PhD student Holt), Satyajit Roy (PhD student Steiner), Suprovo Ghosh (PhD student Chatterjee), Hopefully Pranjal (PhD student Chatterjee), Mateus Pelicer (Postdoc)

(46 members)

SUBGROUPS



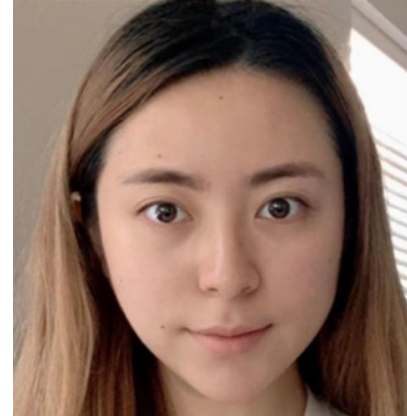
CMF model

Veronica
Dexheimer, Jeffrey
Peterson,
Rajesh Kumar,
Jaki Noronha-
Hostler, Nikolas
Cruz Camacho,
Mateus Pelicer



CEFT

Jeremy Holt,
Pengsheng Wen,
David
Friedenberg ,
Veronica
Dexheimer



QHC

Gordon Baym,
Toru Kojo,
Tetsuo Hatsuda,
Hajime Togashi,
Jaki Noronha-
Hostler, Nanxi
Yao,
Veronica
Dexheimer



UTK model

Andrew Steiner,
Veronica
Dexheimer, Anik,
Hasan,
Lin, Zidu,
Satyajit Roy

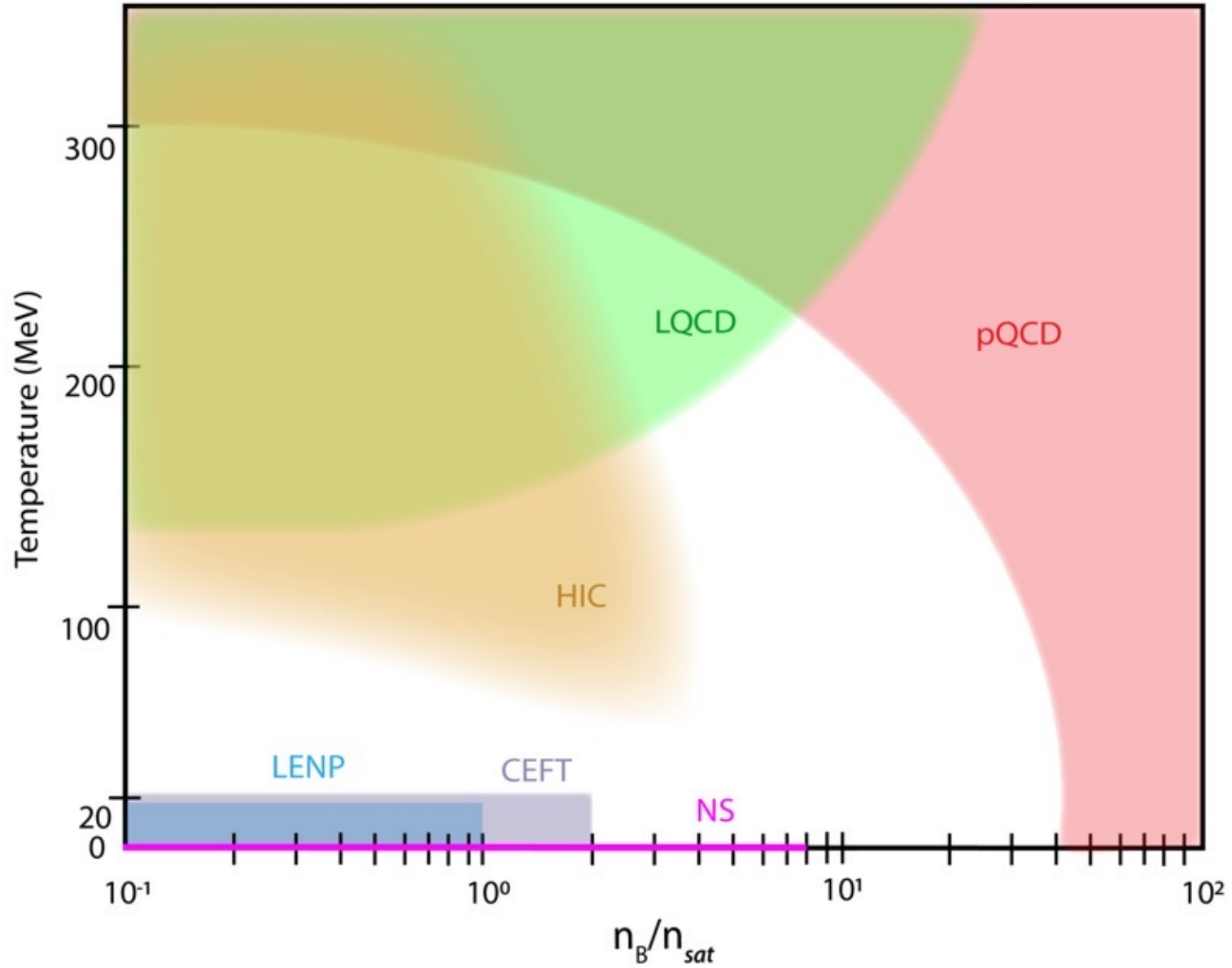
MUSES Constraints list: We discussed relevant nuclear, high-energy, and astrophysics constraints for the MUSES collaboration. We compiled values and references that included first-principle theory and experimental results. We also collected and stored data.

Lepton Module: discussed yesterday!

MUSES Constraints Paper: We transformed the constraint list into a paper (the first one of the MUSES collaboration!). It has been submitted to Living Review of Relativity Journal (<https://arxiv.org/abs/2303.17021>) and it will be updated each ~ 4 years.

QCD Phase Diagram: We built a 2D QCD Phase Diagram using constraints from the paper.

PAST



PAST



FUTURE

We are in the process of extending our QCD phase diagram to other dimensions, starting with isospin (not charge). We already obtained numbers for the isospin fraction $Y_I=I/B$. In the future, we will also add strangeness ($Y_S?$) and magnetic field B .

DISCUSSED IN THIS MEETING

PQCD	LQCD	CEFT	NS	LENP	HIC
Veronica	Joaquin	David	Andrew	Veronica	Jaki
$Y_1 = -0.5$ to 0	$Y_1 = -0.5$ to 0	$Y_1 = -0.5$ to 0	$Y_1 = (-0.5$ to 0) - 0.45 to ?	$Y_1 = (-0.5)$ -0.25 to 0	$Y_1 = -0.12$ to 0
Works everywhere!	Works everywhere!	Works everywhere!	Inside the inner core and from sym. atm. with e.g. He, C to asym. bottom of inner crust	Largest asym. for He-8 in FRIB and even larger asym. for neutron systems	Largest asym. for U nuclei (values include fluctuations)
Refs. from Andersen et. al	Refs. from ?	Refs. from Holt and collaborators	Refs. from ? and Newton et al.	Refs. from FRIB and Tetraneutron	Refs. From Jaki and collaborators



FUTURE II

Work on connecting

UTK – CEFT - CMF – QLIMR - lepton modules:

- CMF will produce CompOSE tables including a 2D grid in n_B (CEFT already has that)

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Work on connecting

UTK – CEFT - CMF – QLIMR - lepton modules:

- CMF will produce CompOSE tables including a 2D grid in n_B (CEFT already has that)
- UTK code will process CMF and CEFT data to calculate nuclei and thermodynamics
- CEFT will work with CMF comparing EOS 's to determine best merging procedure