



# Viewpoint from the DOE Program Manager for HI

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# The DOE-NP Heavy Ion Program

All of Heavy  
Ion Physics





# The 20,000 ft view

RHIC (STAR, PHENIX, sPHENIX)

LHC (ALICE, ATLAS, CMS, LHCb)



The 10,000 ft view: Zero in on **RHIC/STAR**

CME	BES I&II	Hadrons
JETS	FLOW	ETC.



The 5,000 ft view: Zero in on  
RHIC/STAR/Jets

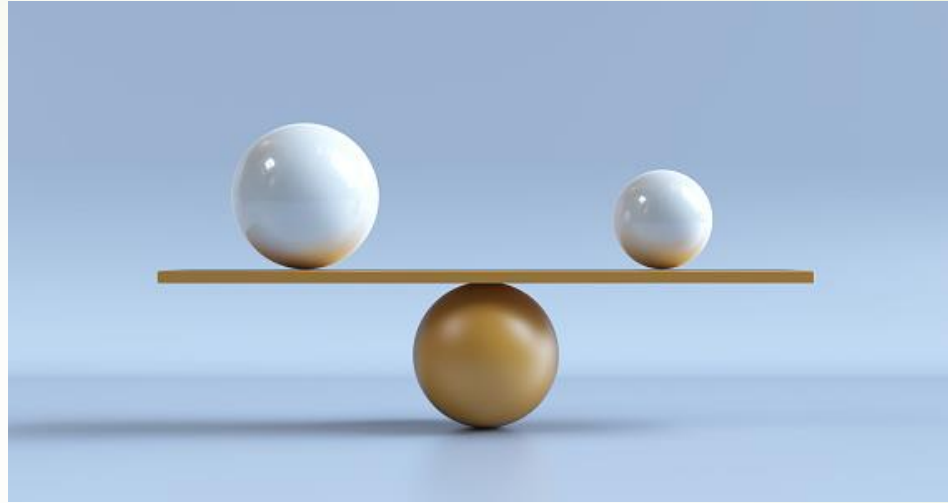
D <sup>0</sup> jet	dijets	HF jets
JETSCAPE	$\gamma$ -jet	ETC.



The 2,000 ft view: Zero in on  
RHIC/STAR/Jets/HF

$D^0$ jets	$J/\psi$ jets	$B^0$ jets
$\mu^+\mu^-$ jets	$e^+e^-$ jet	ETC.

# Question: How to balance the funding?



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# Community Input



- Rather than me deciding on what's important, I **depend on reviews from experts** within the HI community.
- If you are asked to review a proposal, or to be on a panel review, please say “yes”.
- If you receive an email from me about a survey of your opinion about the priority of goals for HI physics, please reply.
- Schedule a Zoom meeting with me if you would like to discuss program priorities.





# Many Exciting Questions in HI Physics

- How to measure the **Chiral Magnetic Effect**?
- Is there a **critical point** in the QGP phase diagram?
- What is the **E-loss mechanism** in the QGP?
- What is the role of **the initial state** in HI collisions?
- What can we learn from hadron correlation?
  - **Hypernuclei** and **anti-nuclei**
  - Hadronic interactions and **resonances**



# What does the future hold?

- ▶ Short term: sPHENIX and STAR high luminosity
  - ▶ **End of RHIC running is scheduled for 2025**
  - ▶ Data analysis will likely continue for 5+ years
- ▶ Longer term: LHC and EIC
  - ▶ Some fraction of the HI community will **transition to EIC**
  - ▶ EIC is the highest priority for DOE-NP
  - ▶ LHC has HI running scheduled through run 4 (and beyond)
  - ▶ Some fraction of the HI community will **focus on LHC**



# What physics will drive the HI program?

- ▶ The HI community may answer some of the important questions in the next few years.
  - ▶ If so, **what new (important) questions will emerge?**
- ▶ I believe it's important for there to be vigorous discussion in the HI community about key physics goals.
  - ▶ The NSAC Long Range Plan (LRP) is about to get started, and the entire NP community will take part in it.
  - ▶ A clear “flagship” idea is needed if HI physics is to have a significant impact at the LRP discussions.



# Overlap of HI physics and EIC physics

- ▶ What is the physics that drives the EIC program and will interest the HI community?
  - ▶ People “vote with their feet”, and **already I see movement of some HI proposals toward the EIC.**
  - ▶ The answer to this question rests with the HI community, and **I will be listening!**
  - ▶ Understanding the role of gluons in nuclei is important, and this is one of the EIC goals, but can we find more overlap with, say, questions about the QGP?



# Summary

- It can be challenging to balance the HI portfolio.
  - **Everyone could use more funding!**
  - The reality is that funding for HI physics will likely be flat
  - What are the most important physics questions?
  - **Community input is important!**
- Transition to the EIC is coming
  - What are the most important questions there?
  - If not at the EIC, then where? Clear goals are needed!