

Dense matter and a hands-on session on the MUSES cyberinfrastructure

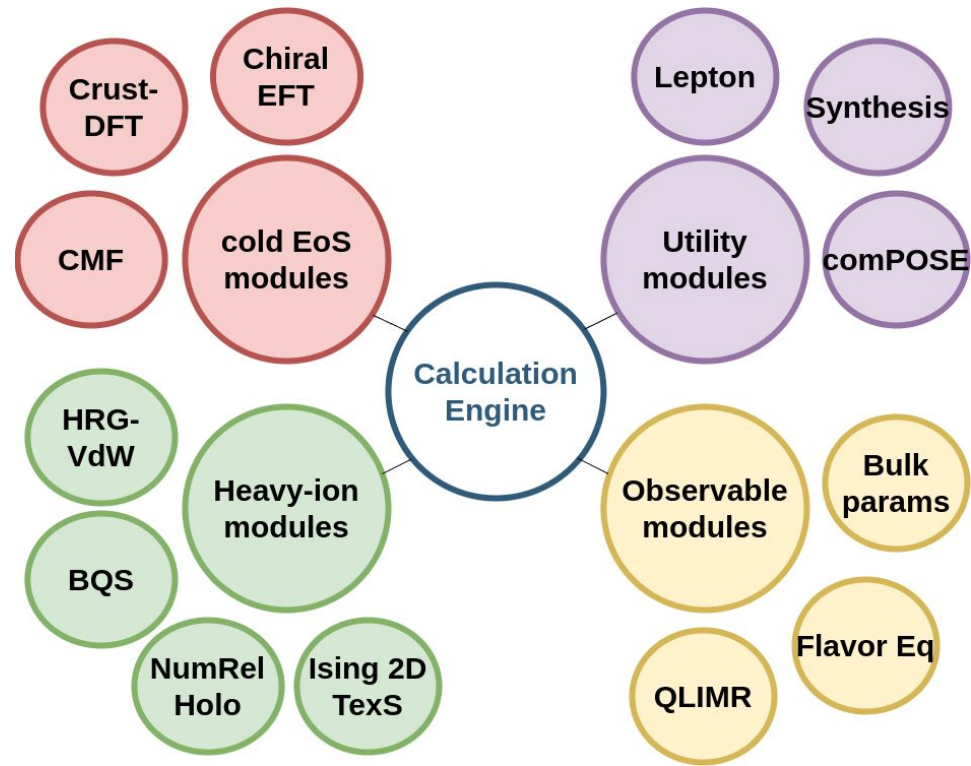
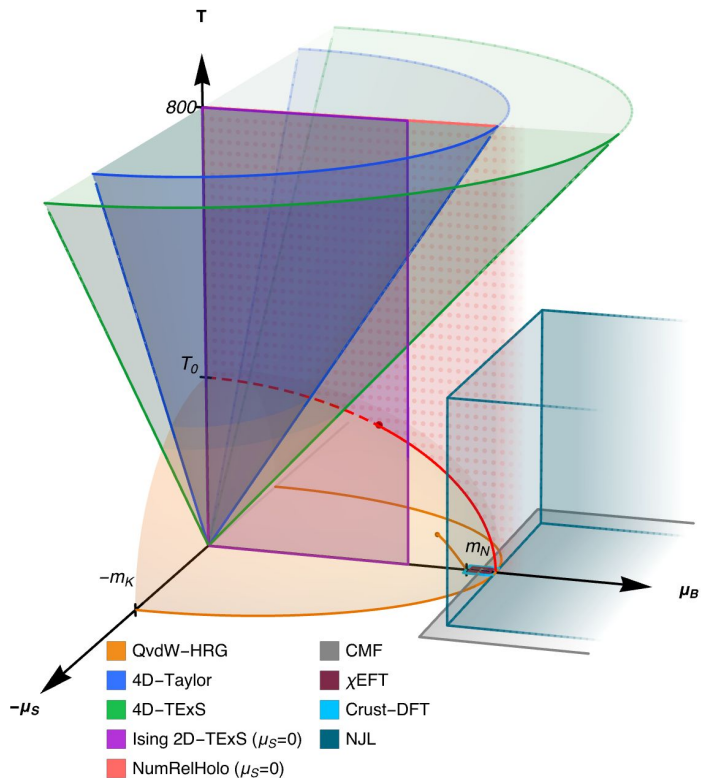
Mateus Reinke Pelicer

University of Illinois Urbana-Champaign

On Behalf of the MUSES Collaboration



Modular Unified Solver of The Equation of State



<https://ce.musesframework.io/>

In this session we will:

1. Sign in to the MUSES Calculation Engine
2. Run workflows through the web interface (Gooney)
3. Run workflows from Python in Google Colab
 - a. Generate a core EOS with CMF
 - b. Generate a crust EOS with Crust-DFT
 - c. Build a combined crust + core EOS
 - d. Compute neutron-star observables with QLIMR



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Getting started

- 📖 [Read the Quick Start guide](#) to setup your account and learn how to run workflows.
- 🗣️ Join the discussion and ask for help [on our community support forum](#).
- 📄 Learn how to [cite this software in your publications](#).

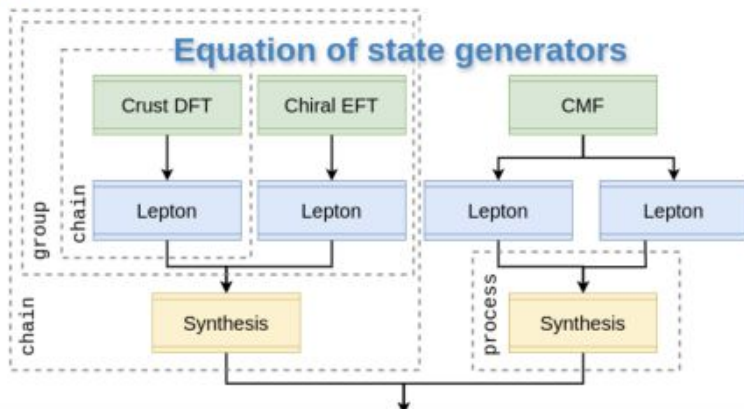
What is the Calculation Engine?

The Calculation Engine is an application that lets you **run scientific calculations as composable workflows**, constructed from a growing library of MUSES modules. The service hosted at <https://ce.musesframework.io> provides the research community with scalable, high-performance computing resources to run intensive calculations.

[The Calculation Engine is free and open source software](#), so if you are interested in learning how to self-host the Calculation Engine on your own hardware, either for development purposes or to operate your own production instance, [please see our developer documentation here](#).

What are workflows?

MUSES workflows provide a way to orchestrate a custom execution of MUSES modules, allowing you to generate equations of state, process and synthesize data, and calculate observable quantities. Individual workflow executions are called jobs, which you can run concurrently on our performant compute nodes to generate reproducible results to download and analyze. [Learn more about MUSES workflows here](#).



Click here

STOP!

Before you login, you *must* read these instructions carefully to create (or use your existing) MUSES account properly.

First, [log in to our community forum using this link](#). This is where you will engage with the MUSES community and seek help when you have questions. The forum login button will take you to a CILogon screen where you can choose which identity provider (IdP) to use for authentication (typically your academic institution). **Once you have chosen your IdP you must always use the same one when logging into MUSES web services.**

Once you are logged into the forum and are satisfied with your selected IdP, proceed to click the login button below. You should be immediately redirected to this home page where you should see your name in the nav bar on the top-right of the screen.

[Click here to learn more about MUSES accounts.](#)

Proceed to login

Click here




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Consent to Attribute Release

MUSES Keycloak requests access to the following information. If you do not approve this request, do not proceed.

- Your CILogon user identifier
- Your name
- Your email address
- Your username and affiliation from your identity provider

Select an Identity Provider

University of Illinois Urbana-Champaign 

Remember this selection 

Log On

By selecting "Log On", you agree to the [privacy policy](#).

Click here 

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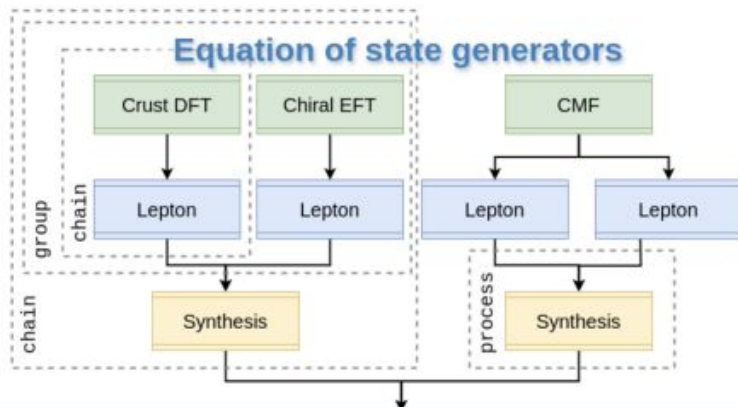
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 Request

This group defines who is authorized to use the [MUSES Calculation Engine service](#) operated by the NSF-funded MUSES project.

If you would like to use the Calculation Engine, please read the following carefully:

- Use of the CE indicates your [acceptance of our Terms of Service](#).
- Requests are manually approved by designated collaboration members, so please be patient. You will receive a message when the request is processed.
- If approved, **you will need to log out of the CE and reauthenticate for the changes to take effect.**
- Press the Request button in the top-right corner of this message box to get started.

ce-users

 [Members \(33\)](#)

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Calculation Engine Users @ce-users

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- reque
- If app
- Press

Request to join @ce-users

Let the group owners know why you belong in this group

Click here

Submit Request cancel

You're not allowed to view the members.

- Open <https://github.com/mrpelicer/muses-csqcd2026>
- If you are familiar with git and notebooks, you may clone the repository and start a server locally (or in VSCode)
- Else, click Open in Colab ([GoogleColab](#))

