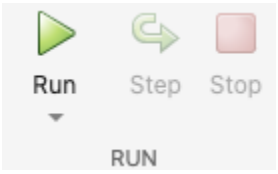
The attached is a GUI in MATLAB to simulate configuration/experiment with a variety of potential Tutti-Frutti assemblies. While it is currently functional, there is still quite a bit of work to be dine to get it in proper usable working order. Below you'll find installation instructions, lists of potential future modifications, and other essential reference. Please feel free to reach me at aidanhkung@gmail.com if you have any questions!

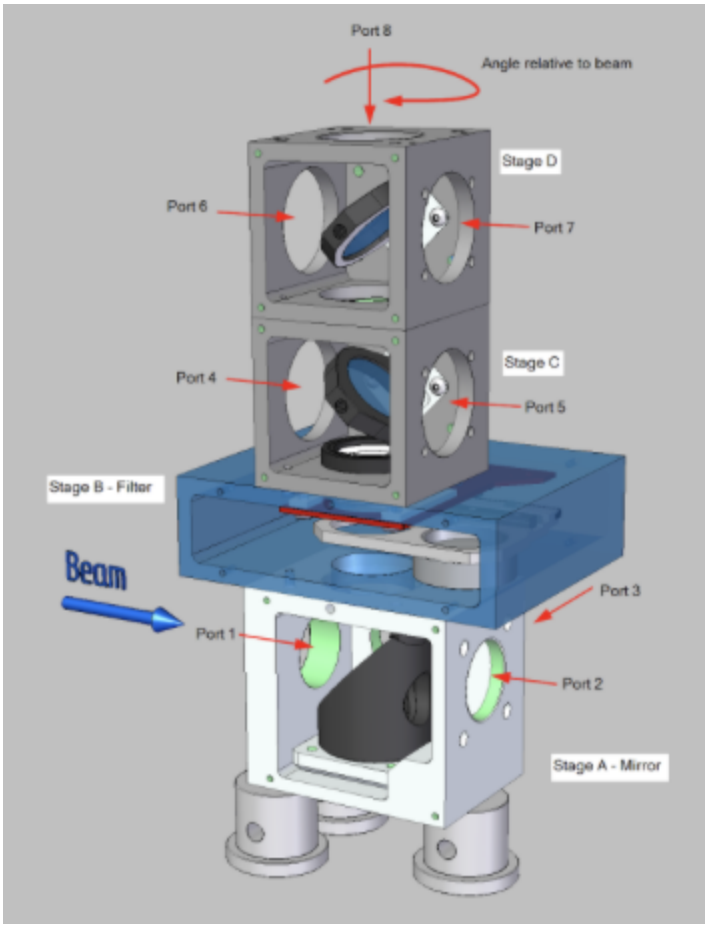
INSTALLATION

1. Download the file called "Tutti_Frutti_GUI_Experimental.mlapp", and open it in MATLAB.
2. Near the upper right of the screen in the app designer interface, you will see tabs titled "Design View" and "Code View". In "Design View", you will see a snapshot of what the GUI will look like once run and you can add functionality and features in the Component Library to the left; doing so will automatically populate the backend code behind the GUI that you can find in "Code View". You use Code View to add logic to the features you added in Design View.
3. Higher up, in the toolbar, you will see a "Run" button with a green triangle. Click on this to run the script and launch the GUI, which you can then use.



4. Description of functionalities

The GUI is a tool that allows for the simulation of conditions that could be encountered when a laser is passed through the assembly during an experiment, and reads out key beam parameters (like energy density, peak power, total energy, etc) at each output port, and potential warnings as to damage that could be encountered and tool incompatibilities with the beam for any given configuration. For reference, I've attached a screenshot of a default standard Tutti Frutti with entry/exit ports labeled for reference.



NEEDED ADDITIONAL FUNCTIONALITY/MODIFICATIONS

1. It is necessary to cross check the theoretical outputs of the GUI with experimental outputs from the scientists in the Near Hall (available from Brett Chmiel) to verify the accuracy of the software.
2. Spec out port 5 conditions for NRF and Spectrometer
3. Spec out Near/Far Field Camera and Quad Cell conditions for ports 4 and 7
4.

NOTES

1. Attached here is a file detailing the beam path as it travels through the bottom base of the Tutti-Frutti, travels up the device, reflects back down from the top, and exits at each of the entry ports along the side. I've also attached a document detailing all the potential configurations of the tool/configurations currently in use, as well as some additional reference images, to inform future modification and addition of necessary functionality.

https://docs.google.com/spreadsheets/d/1neuqYxFCbCfOgjX0tM9k9vuWpQDEeLq9mPGP8Ix7K6Q/edit?gid=0#gid=0
https://docs.google.com/document/d/1RS_LXOkiwzNp5aSU3Y7wEn4zW7EQygwq/edit?usp=share_link&ouid=112073357413408112482&rtpof=true&sd=true

2. The code logic more or less follows the beam path as detailed above, covering the configuration of the components of the tool essentially from bottom up; this allows for a logical straightforward interpretation/modification of the code. Along the code, I've added green annotations detailing variable names for clarification.
3. With regard to the Reflection Plane, the images can be misleading. It's important to note that only one of the 3 potential reflection planes is in use at any given time for a configuration; not all 3 at once.