

Installation

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This document describes all the steps and necessary information to successfully install the matRad software and test it.

System Requirements:

Treatment planning tutorials can be done with systems starting with 2GB RAM. For a more detailed treatment planning and realistic resolutions, we recommend 8GB RAM or more. More information can be found on:

<https://github.com/e0404/matRad/wiki/Minimum-System-Requirements>.

It runs **on a 64-bit computer for:** Windows, Linux & Mac (32-bit OS is not supported).

Simplified matRad installation for Masterclass:

The easiest option is to use the matRad standalone application (for Windows) that does *NOT* require MATLAB.

It can be downloaded from the following links:

- Windows 64-bit:
https://drive.google.com/file/d/1DGCCQgSOxjWZuQ68kxJBW7YdFUd_u_tZf2/view
- Linux 64-bit:
<https://drive.google.com/file/d/1wzdXEfEsR7R2F2E9YaMw9-CdVHhb8I6U/view>
- Mac 64-bit:
https://drive.google.com/file/d/1hDS_qoRtPr6wzsNmprr_d2UdW7d5rPz/view

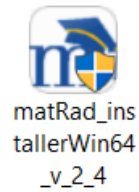
Opening the respective links, one can download the file for the corresponding software:

(matRad_installerMac64_v_2_4.dmg, matRad_installerWin64_v_2_4.exe,
matRad_installerLinux64_v_2_4.install)

Once the matRad file is downloaded on your computer, continue with the installation, by clicking at the respective image according to the operating system.

For Windows 64-bit

For Windows the .exe file has the following image.

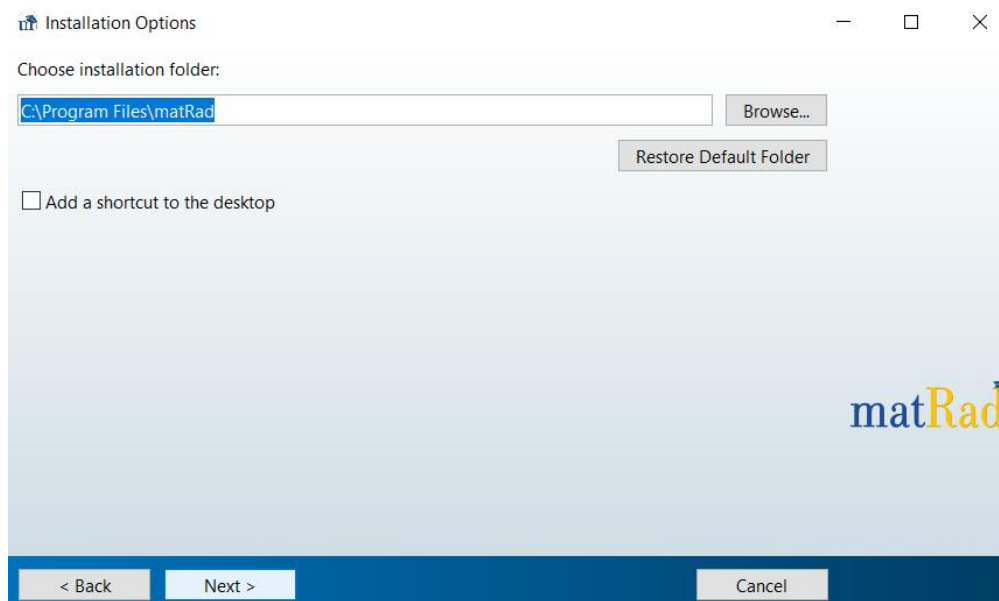


Click on the **matRad_installerWin64 image**, the following window will appear.



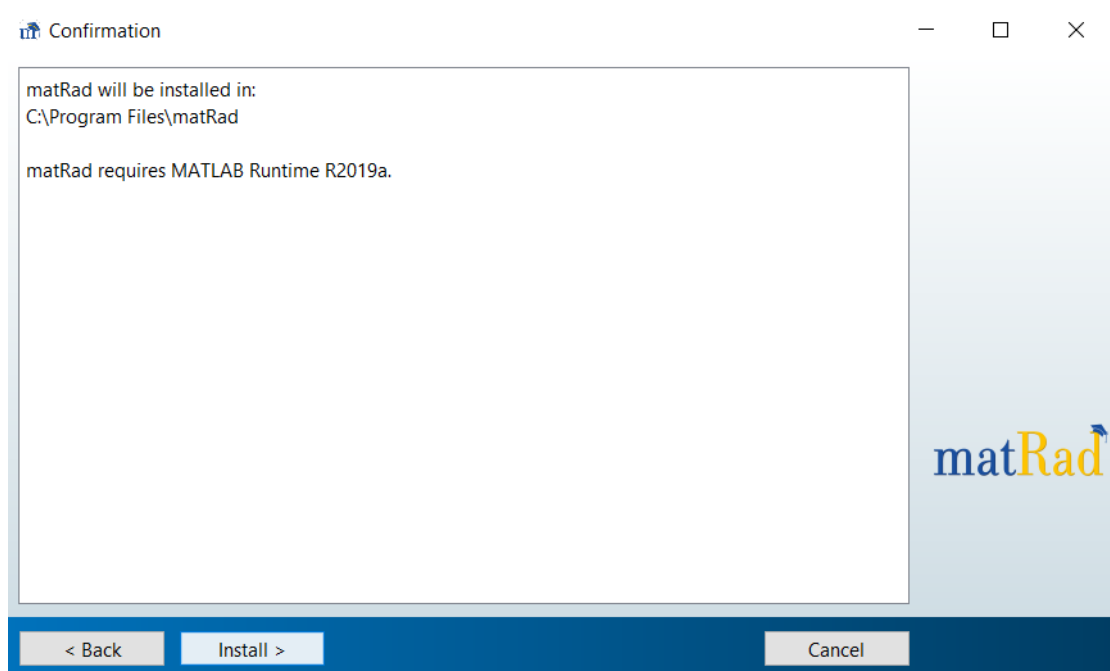
Then, click “**Next**” and the next window will unfold.

Then, select the directory on the hard disk, where it will be installed.

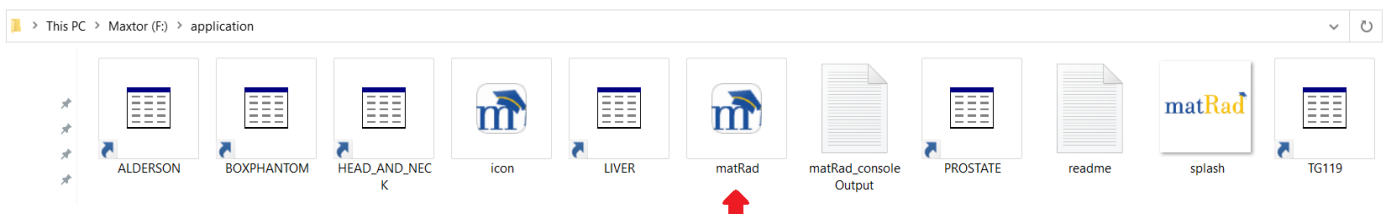


Then click on the “**Install**” button to confirm the installation process.

Then, a charging bar will appear that will inform, about the installation process.



Once the process is finished, double click on the image of the matRad application in the corresponding file, where it is installed.



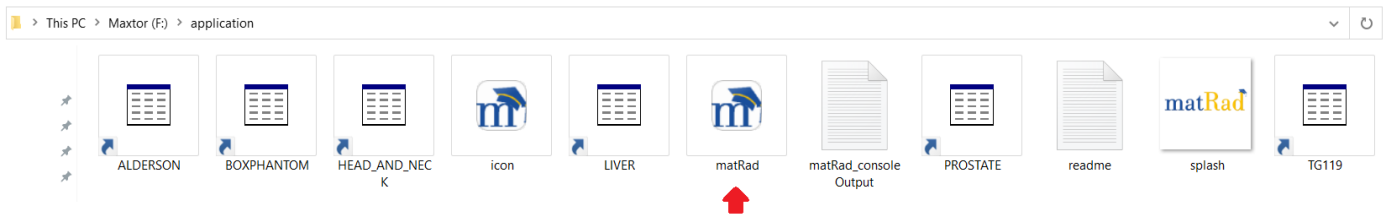
For Windows, two files should be shown, with the names:

- “application” and
- “appdata”

appdata	11/20/2020 1:31 PM	File folder
application	11/20/2020 1:48 PM	File folder

After the installation, it should be verified that the data were downloaded checking in the “application” file.

The application file contains the matRad application button, together with the data for the different cases (LIVER, HEAND_AND_NECK etc).



The application icon will pop up and there will be a waiting time to load the software.

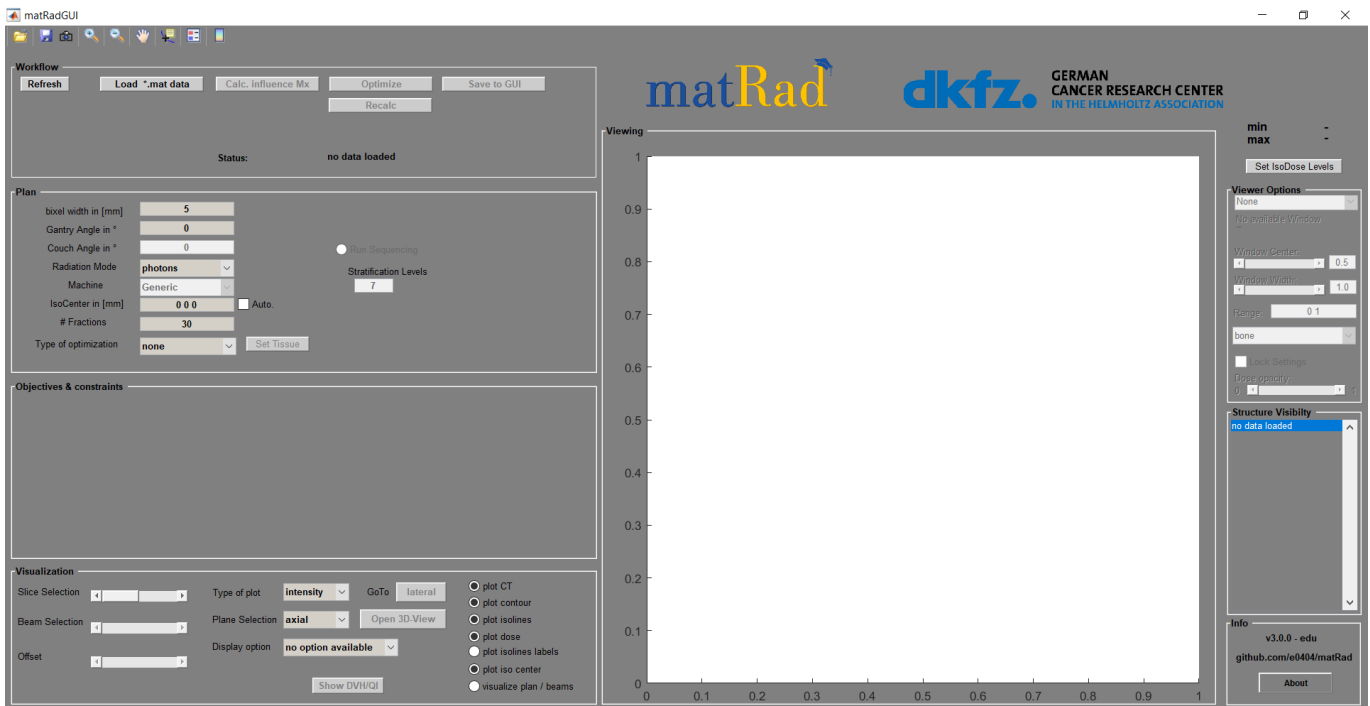
matRad

Test

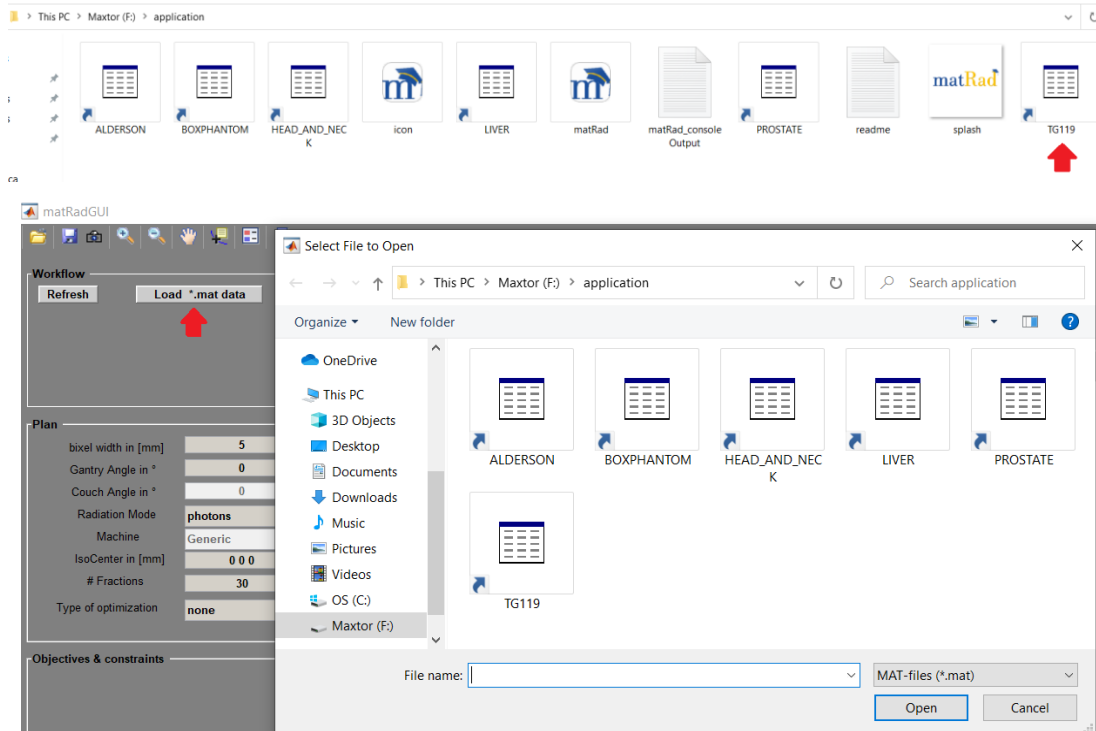
The matRad software contains in the “application” file data for three cases:

- TG-119 or C-phantom (testing sample),
- Liver case and
- Head and Neck (H&N).

By clicking on the image above the software will be loaded and the initial matRad screen will appear. Notice the different panels (Workflow, Plan etc.).

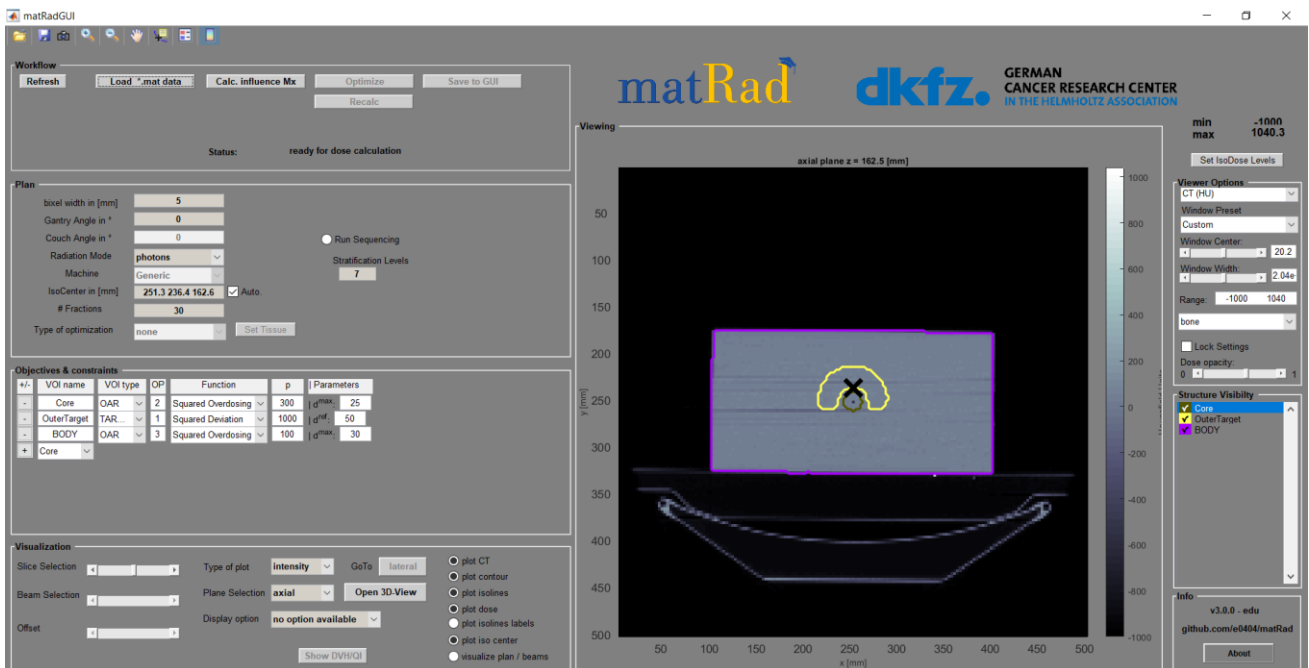


Add the patient data by clicking “**Load*.mat data**” from the Workflow panel. To try the functionality of the software, let’s load the testing sample data (TG-119).



After loading the data, the image below is expected to appear.

Observe that objective & constraints have appeared in the respective panel.



Next step is to set the parameters of the treatment plan from the "**Plan**" panel.

As a test example, optimize a single photon beam at 0 degrees gantry angle, by setting the parameters at the left-hand-side panel "**Plan**".

For testing set the parameters:

Radiation Mode: photons

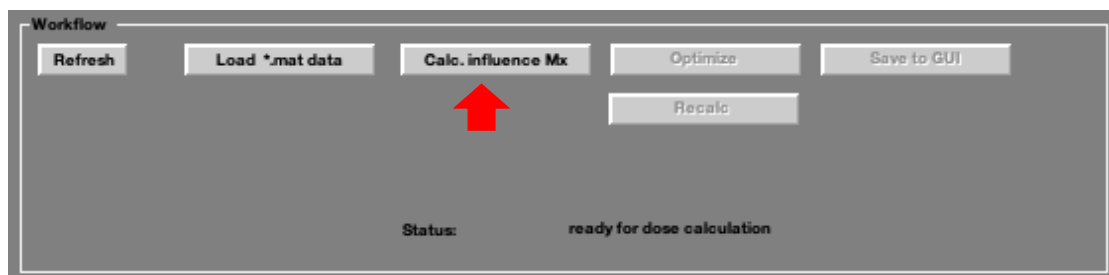
Gantry angle: 0

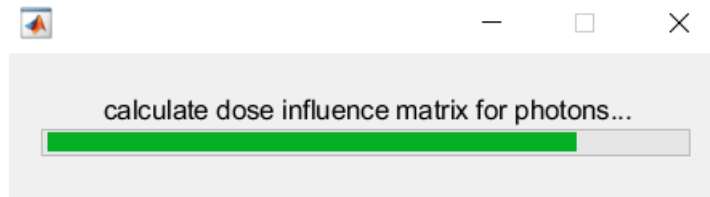
Bixel width : 5

Note that: "Cubes" of bixel-size build up the tissue.

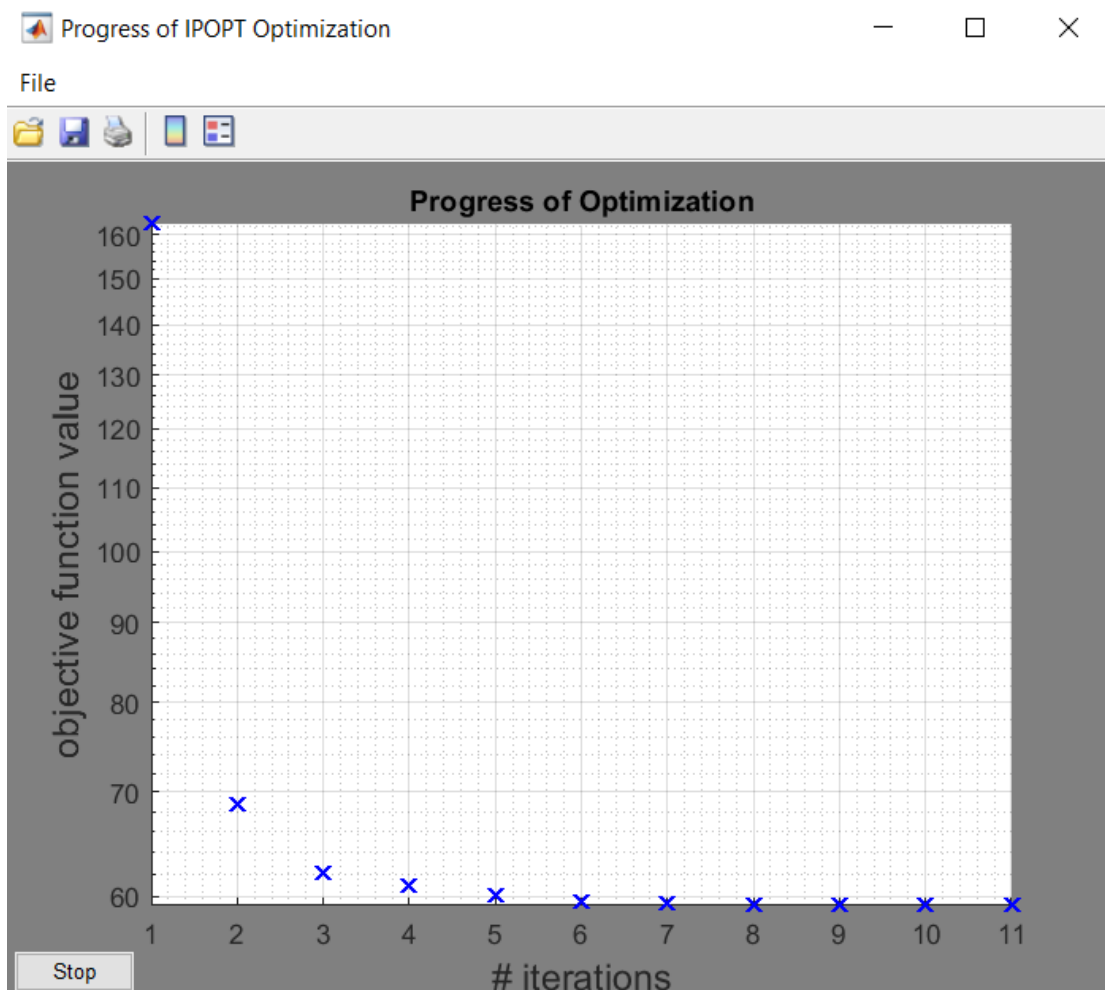
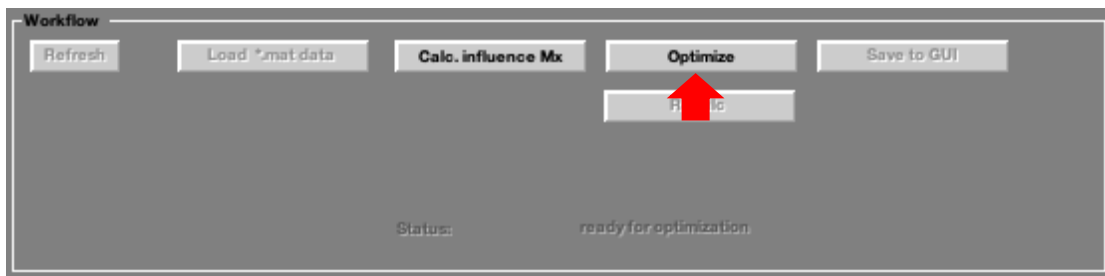
After this is done, press the "**Calc. Influence Mx**" button to continue with the next step: the calculation of the matrix of influence (of the radiation).

A charging bar should appear, and it may take some time.





After the calculated matrix, press the **optimization button**, which will also show the “**Progress of Optimization**” panel displaying the exponential dose distribution as a function of iterations.



To save the calculations click on the “**Save to GUI**” button that will be enabled only after the optimization.

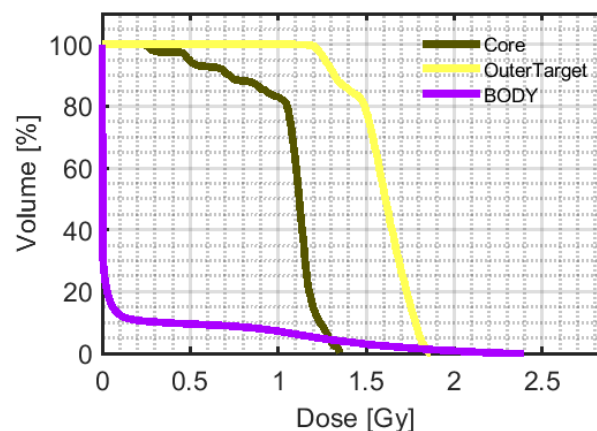


Then click on the **Dose-Volume Histogram button**: it is the last step in order to obtain the optimization’s results..



This function will provide

- the corresponding DVH histogram and
- the table containing the mean doses distributed in each organ, target, tissue, together with the maximum and minimum doses and the standard deviation of the values.

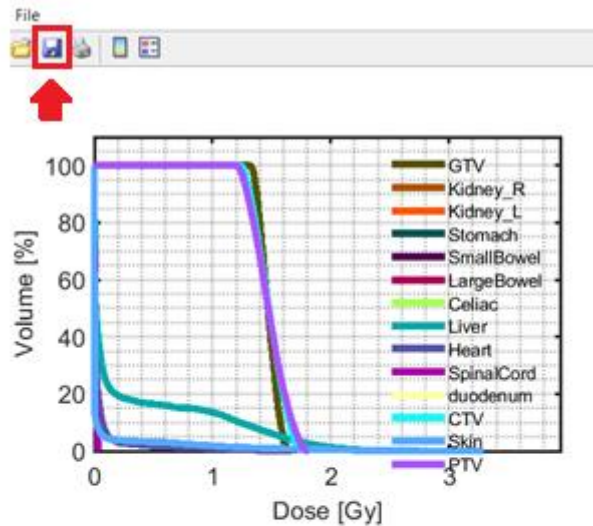


	max	min	mean
Core	1.3525	0.2364	1.0615
OuterTarget	1.8672	1.0975	1.5905
BODY	2.3969	0	0.1373

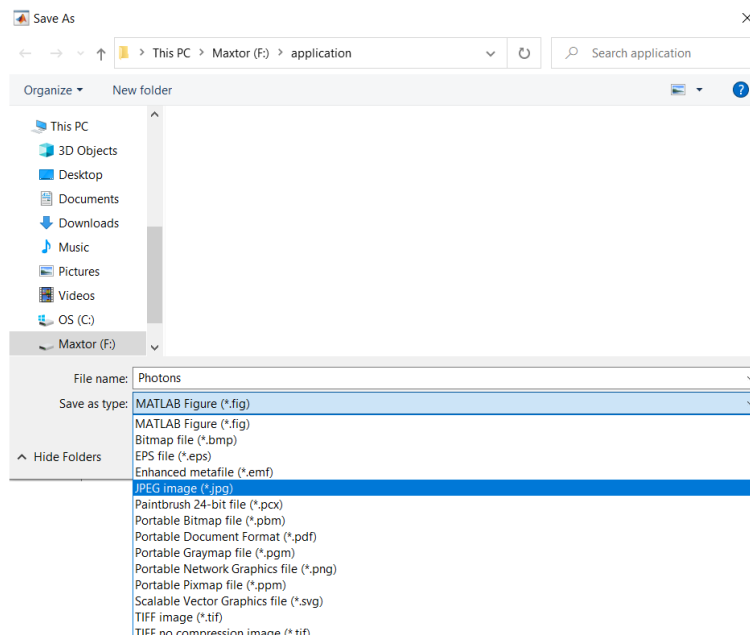
For each case, save the corresponding DVH and its table. They are needed to be able to compare the different cases at the end of the masterclass session.

Saving them can be performed by clicking on the **disk sign** above DVH and setting an appropriate file name for each case, e.g. for TG-119 and 1 angle radiation of photons a suggested name is

“C_1_photons_NameOfParticipant”. Save the type of file **to JPEG format**.



	max	min	mean
GTV	1.6394	1.3173	1.4714
Kidney_R	0	0	0
Kidney_L	0	0	0
Stomach	0	0	0
SmallBowel	0	0	0
LargeBowel	0	0	0
Celiac	0	0	0
Liver	2.6394	0	0.2547
Heart	1.6706	0	0.0370
SpinalCord	0.0383	0	0.0053
duodenum	0	0	0



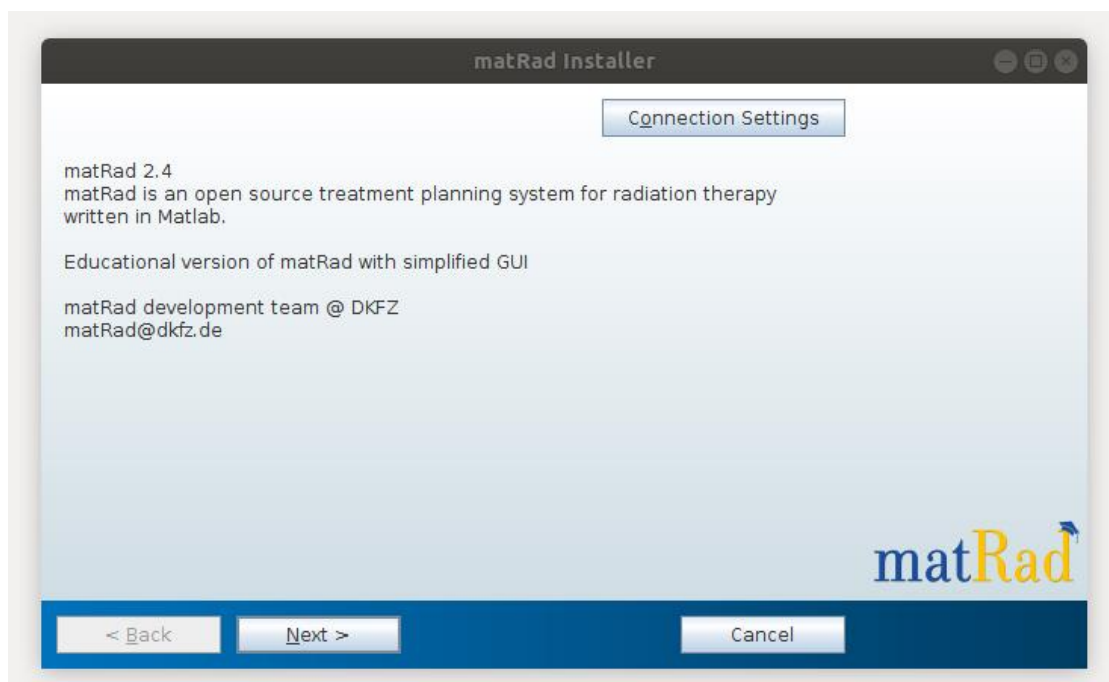
Then change the plan parameters (e.g. set up for protons, and/or change the angles) and repeat the process already described above. At the end, the aim is to compare the results for photons, protons and C-ions.

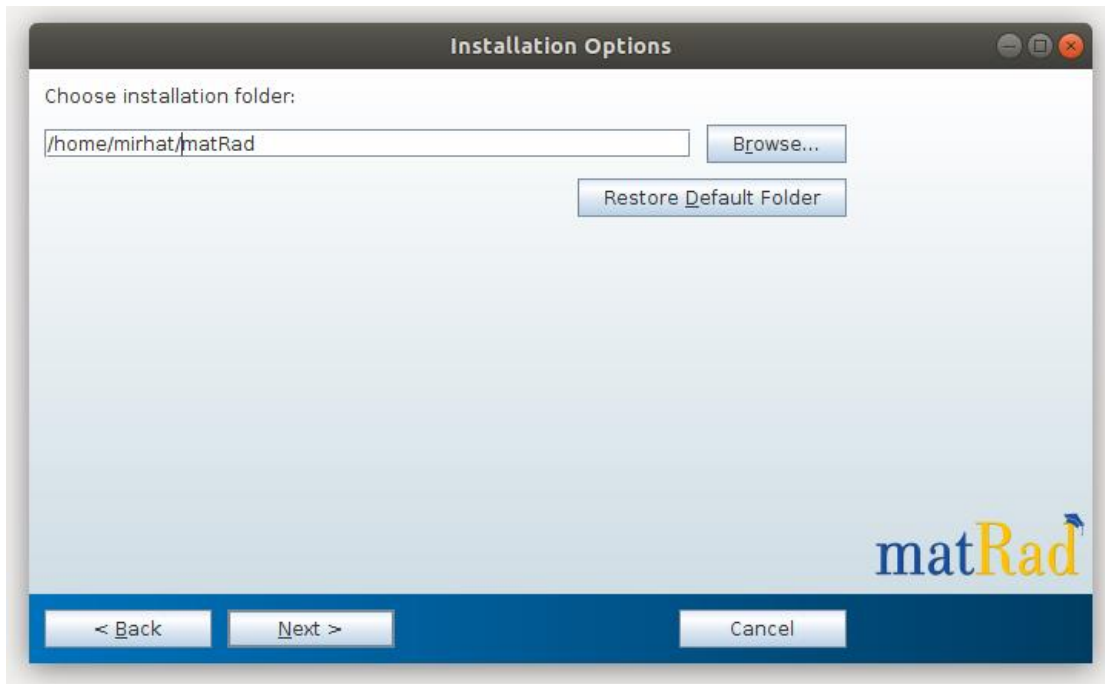
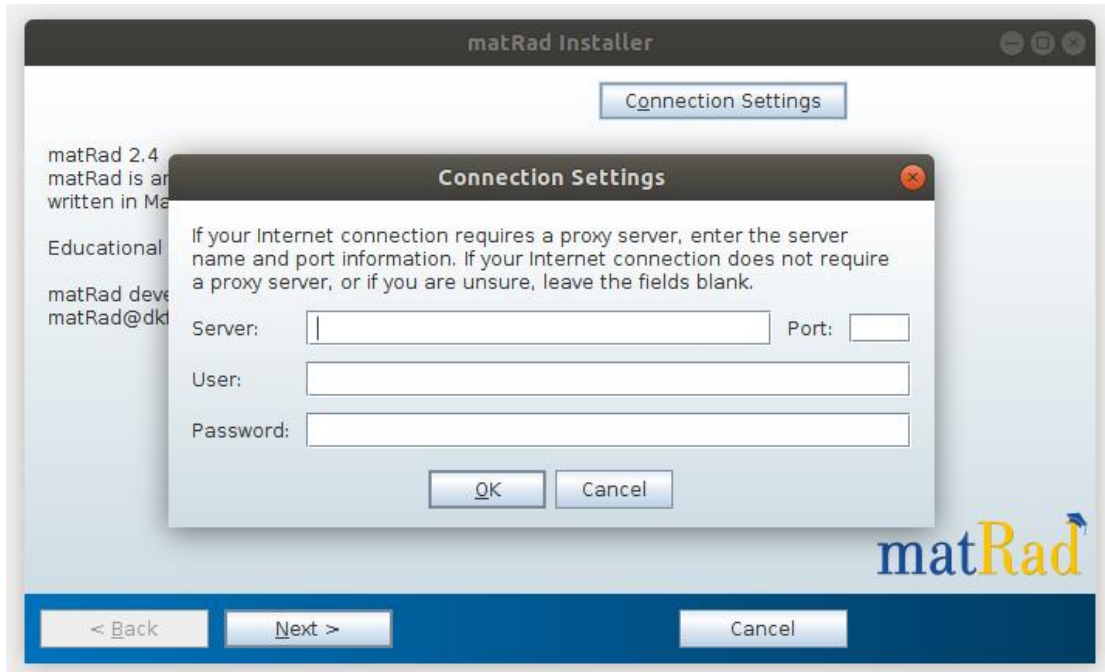
For Linux 64-bit

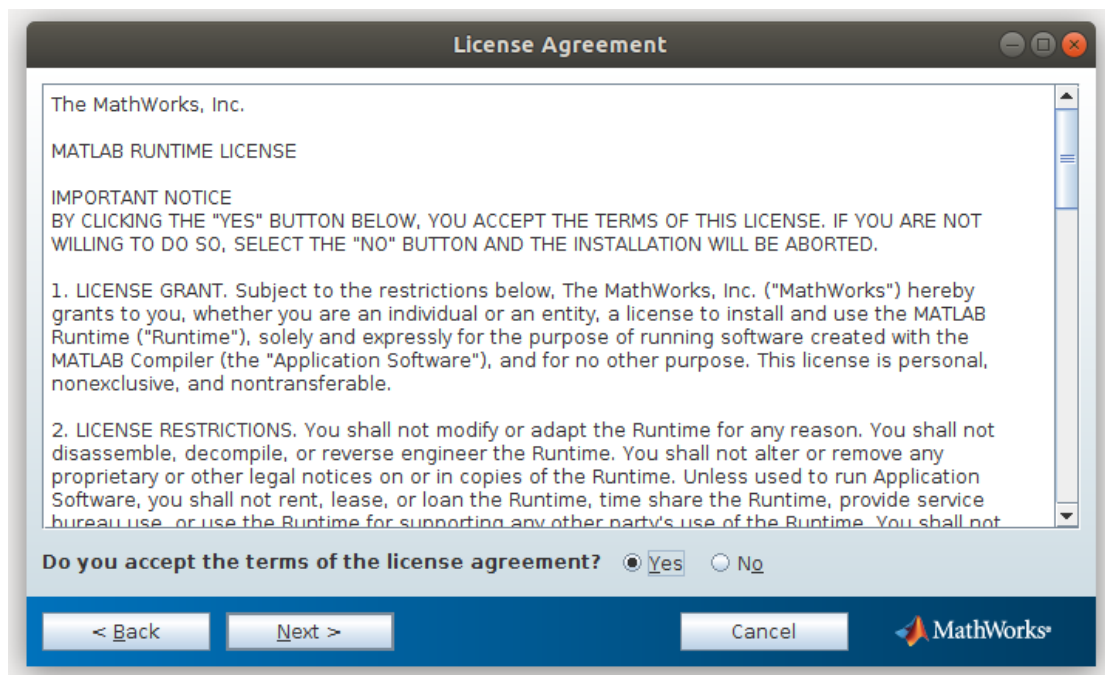
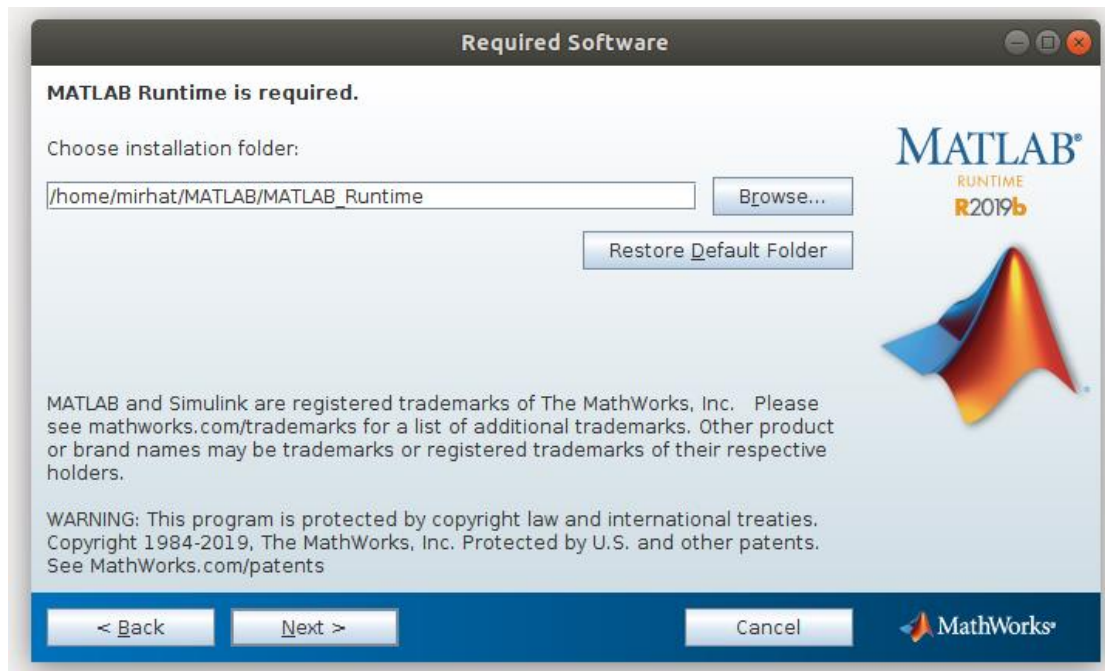
The installation for Linux is performed in a similar way, as already described above for Windows installation.

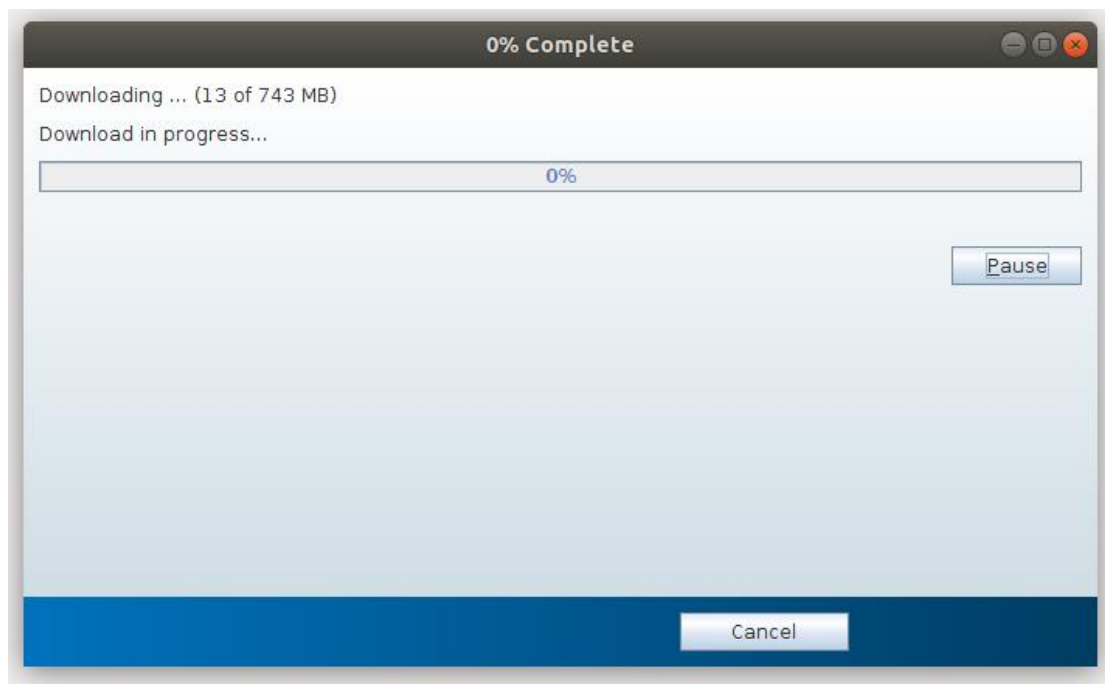
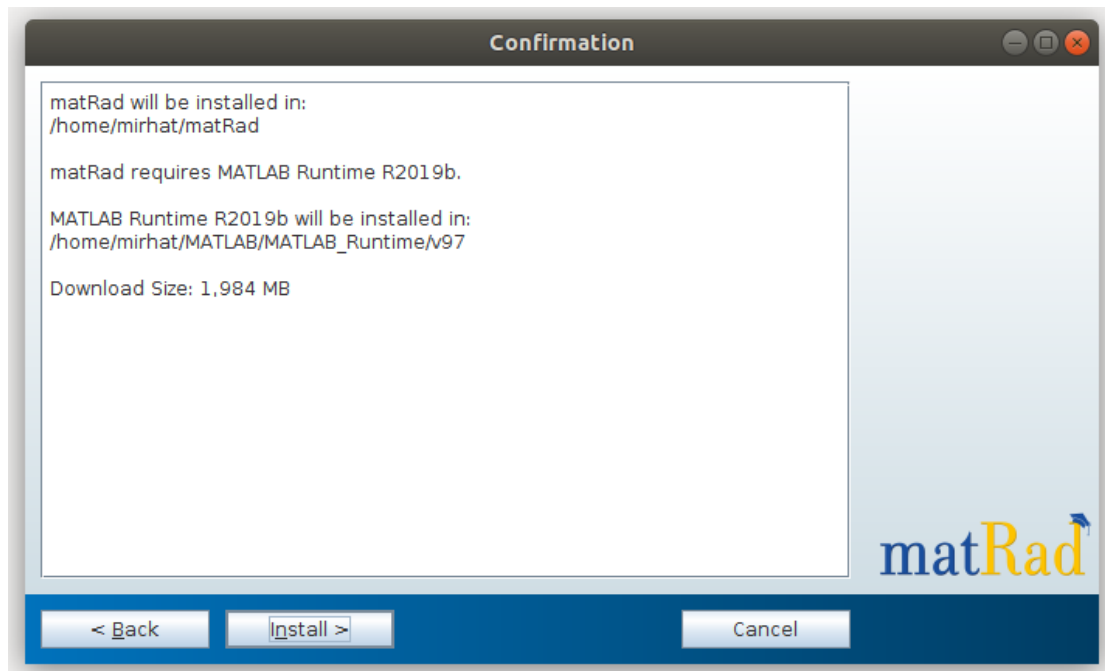
After downloading from the link, start the installation in console as shown in the next figure.

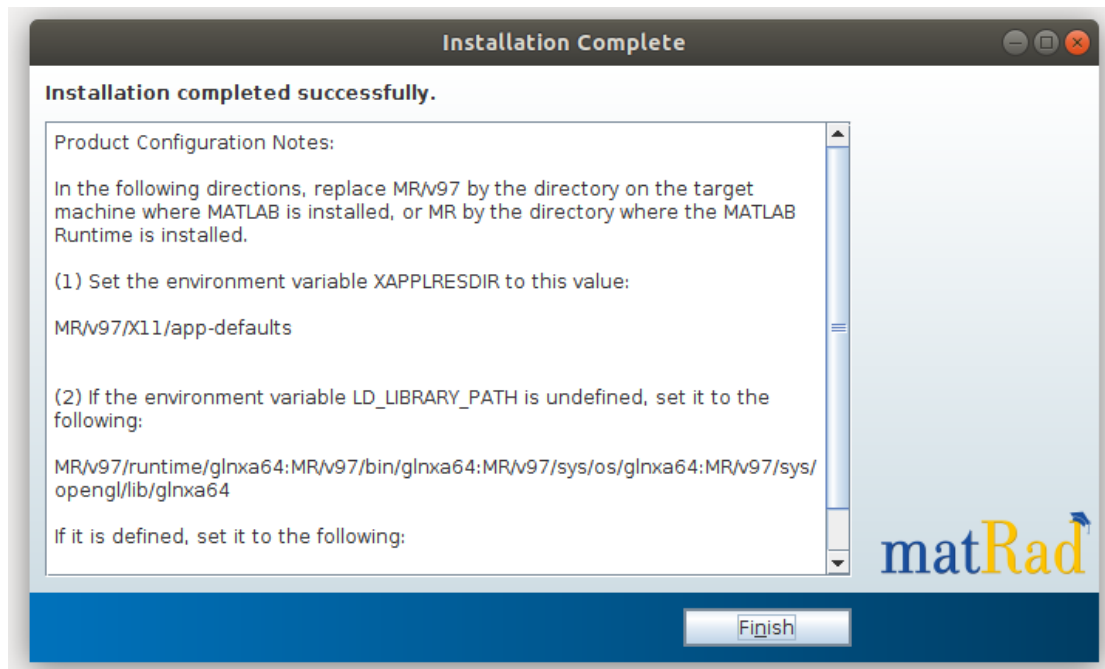
```
File Edit View Search Terminal Help
mirhat@mirhat-H310M-S2H:~$ cd Downloads/
mirhat@mirhat-H310M-S2H:~/Downloads$ chmod +x matRad_installerLinux64_v_2_4.install
mirhat@mirhat-H310M-S2H:~/Downloads$ ./matRad_installerLinux64_v_2_4.install
Installing ...
█
```



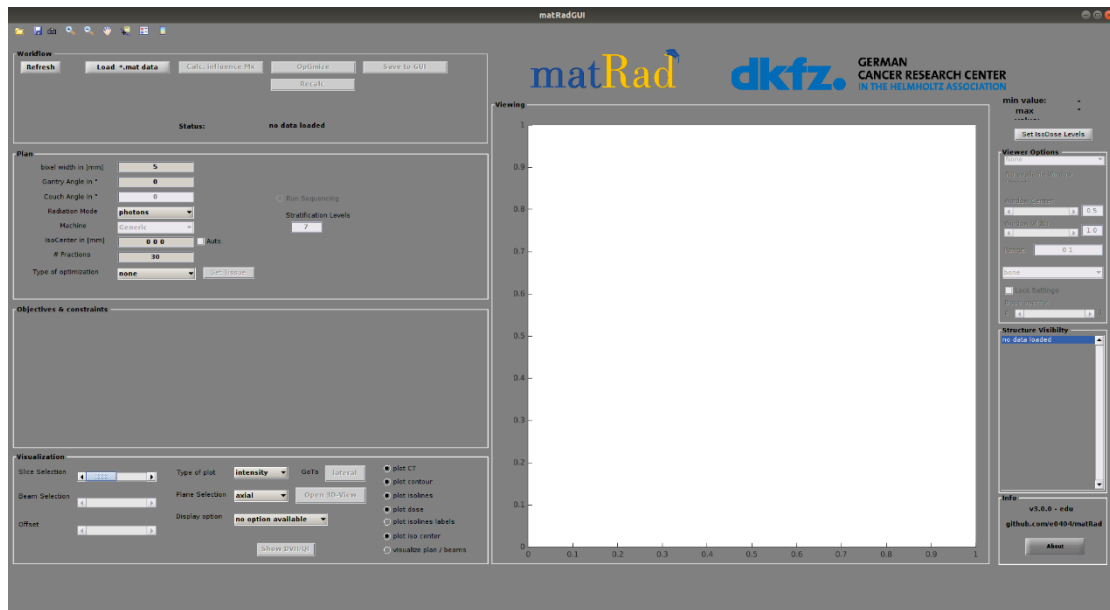








```
mirhat@mirhat-H310M-S2H:~$ cd matRad/application/
mirhat@mirhat-H310M-S2H:~/matRad/application$ chmod +x run_matRad.sh
mirhat@mirhat-H310M-S2H:~/matRad/application$ ./run_matRad.sh /home/mirhat/MATLAB/MATLAB_Runtime/v97/
-----
Setting up environment variables
---
LD_LIBRARY_PATH is ./home/mirhat/MATLAB/MATLAB_Runtime/v97//runtime/glnxa64:/home/mirhat/MATLAB/MATLAB_Runtime/v97
Runtime/v97//sys/opengl/lib/glnxa64
matRadGUI starting in educational mode!
Warning: The JavaFrame figure property will be removed in a future release. For more information, see <a href="http://
rs/a> on mathworks.com.
> In matRadGUI>resetGUI (line 132)
   In matRadGUI>matRadGUI_OpeningFcn (line 441)
   In gui_mainfcn (line 220)
   In matRadGUI (line 81)
[]
```



CONTACT

For any questions or any problem, feel free to contact Aris Mamaras in the following mail:

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I will be glad to help you in your journey to particle therapy knowledge!