

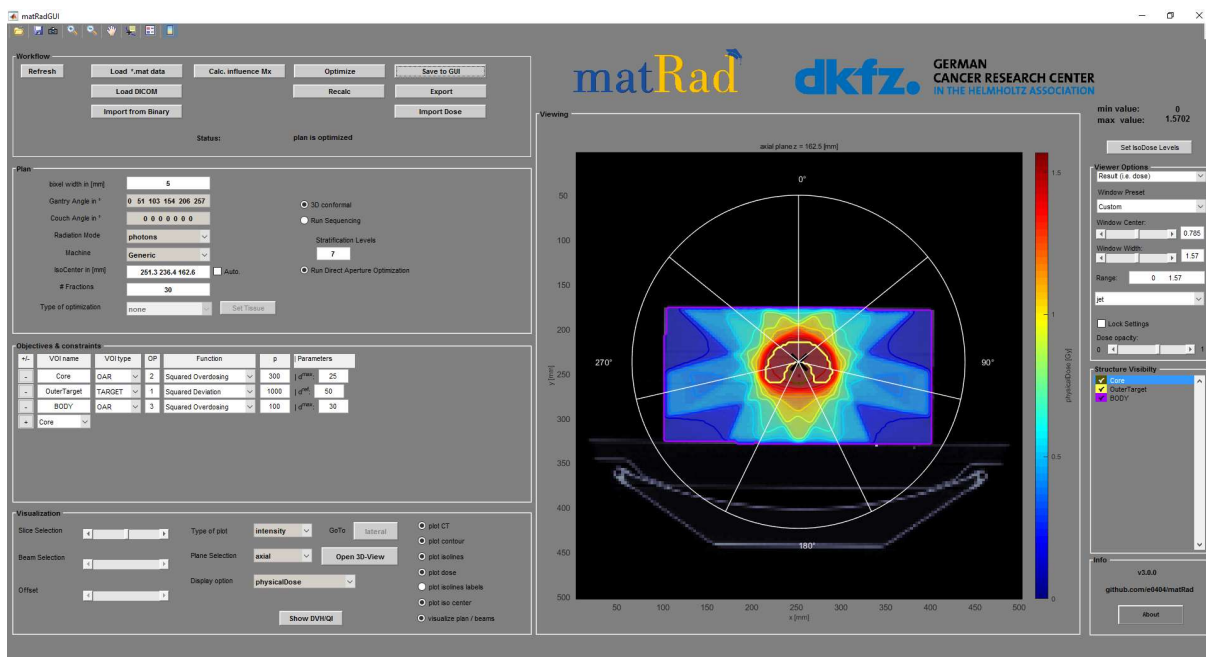
## Hands-on treatment planning with matRad

### Session 1: Basic principles & comparison of photons and protons

28.01.2021

#### Task 1: Intensity modulated radiation therapy (photons)

Open matRad User Interface



Load \*.mat data and choose TG119

Choose the following objectives or similar

+/-	VOI name	VOI type	OP	Function	p	Parameters
-	Core	OAR	2	Squared Overdosing	300	$d_{max}^{ref}$ : 25
-	OuterTarget	TARGET	1	Squared Deviation	1000	$d_{ref}^{ref}$ : 50
-	BODY	OAR	3	Squared Overdosing	100	$d_{max}^{ref}$ : 30
+	Core					

Start with one gantry angle photons, keep the other settings.

Calculate the dose influence matrix by clicking **Calc influence Matrix**

Then click **Optimize**

Save your dose to the display list with **Save to GUI** and choose a name (e.g. imrt1). You can export an image using the screenshot button:



Use **Show DVH** to see the DVH and dose metrics for all OARs and target (you can also export an image for your report)

Treatment planning practical

Repeat the same for at least 5 beams (couch angle at 0°, the number of gantry and couch angles have to be identical)

Compare the mean and maximum dose to the OAR 'Core' for the two dose distributions

Compare the mean and minimum dose to the Target 'OuterTarget' for the two dose distributions

Explore the trade-off between target coverage and OAR sparing by changing penalty and dose values

Turn on **Run Sequencing** with 5 stratification levels and **Optimize** again

Compare D95% (Target) to the non-sequenced treatment plan

## Task 2: Basic intensity modulated proton therapy

Change radiation mode to protons

Calculate the dose distribution for protons (**Calc influence Matrix** and **Optimize**)

Compare the dose distribution to the photon treatment plan – what are the most striking differences?

Increase the number of beams to 3 and evaluate the changes.

## Task 3: Basic treatment planning for real patient case

Load **\*.mat data** and choose PROSTATE.mat

Inspect the geometry of the patient by scrolling through the axial slices

With **Open 3D-View** you can get a 3D illustration of the patient (may take a while)

1<sup>st</sup> radiation mode: photons

You are free to choose the number of beams, the gantry and couch angles, and penalty and dose objectives

Try to calculate a treatment plan with the following prescription:

- D95% to PTV 56/68 at least 56/68 Gy
- Mean dose to femoral heads < 15 Gy
- Max dose to femoral heads < 45 Gy
- Rectum & bladder volume that receives more than 30 Gy: < 50%
- rectum volume that receives more than 60 Gy: < 20%
- bladder volume that receives more than 60 Gy: < 25%
- No dose hot spots in normal tissue

2<sup>nd</sup> radiation mode: protons

You are free to choose the number of beams, the gantry and couch angles, and penalty and dose objectives