



Particle Therapy Masterclass

Warsaw University of Technology (Poland)

**LO im. AM Piastów, LO im. Z Zamość, CXXII LO im.
ID Warsaw, Wyspa JP2**

Imagination vs reality in radiotherapy

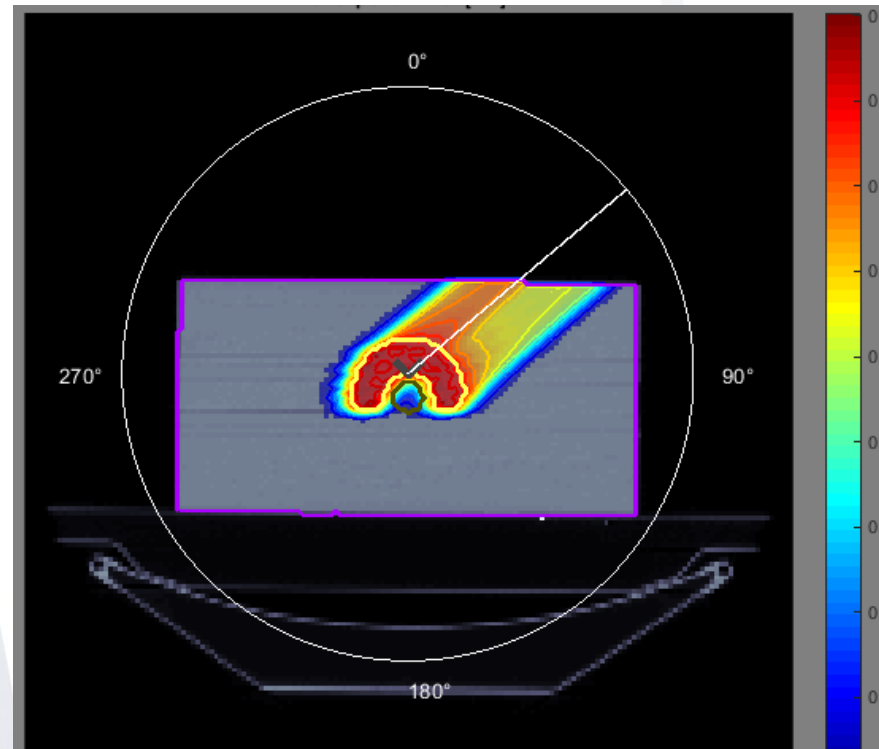
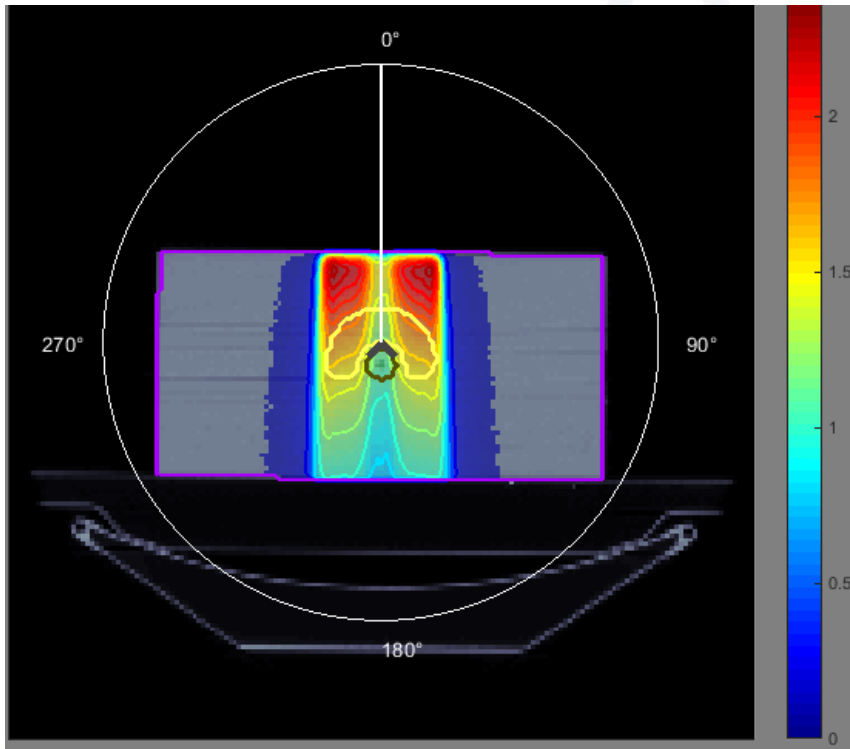
Large-scale Analysis

~20 researchers

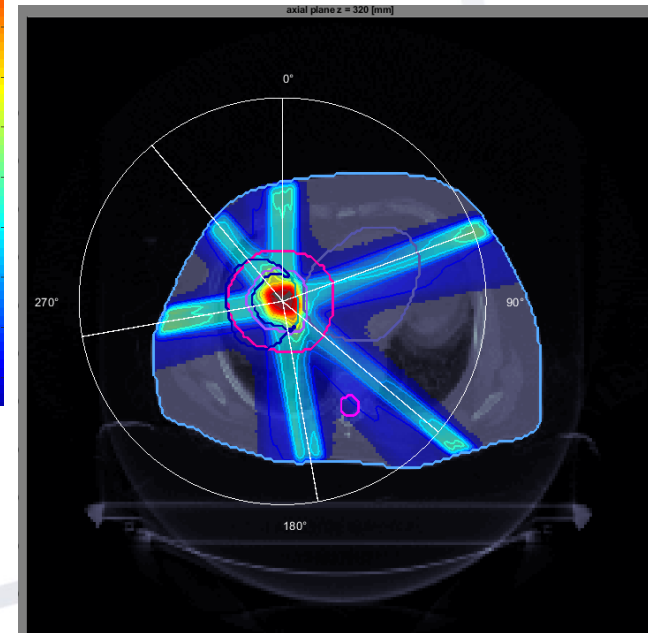
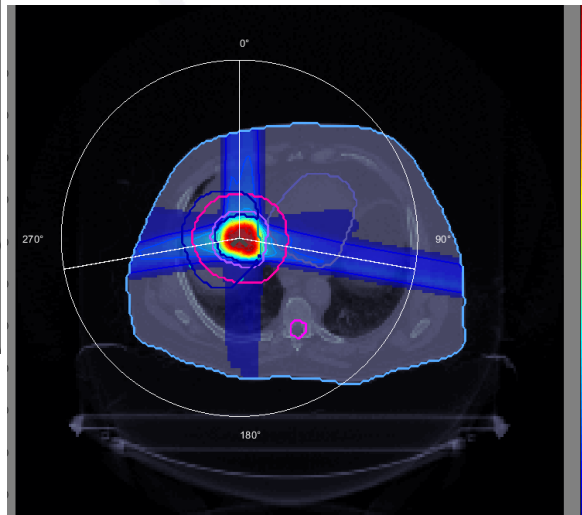
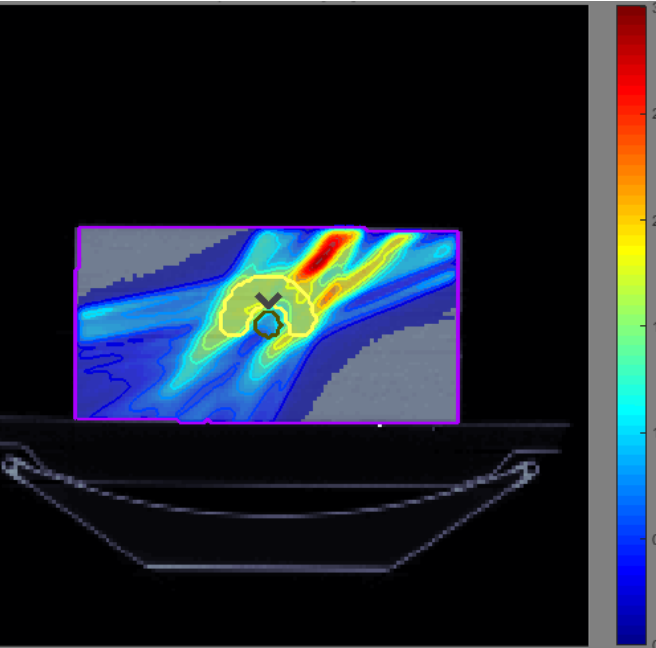
- analysed three treatment plans
- for beams of photons, protons, carbon
- result:
 - We realized the hardships of planning the treatment
 - Some of requirements weren't met in

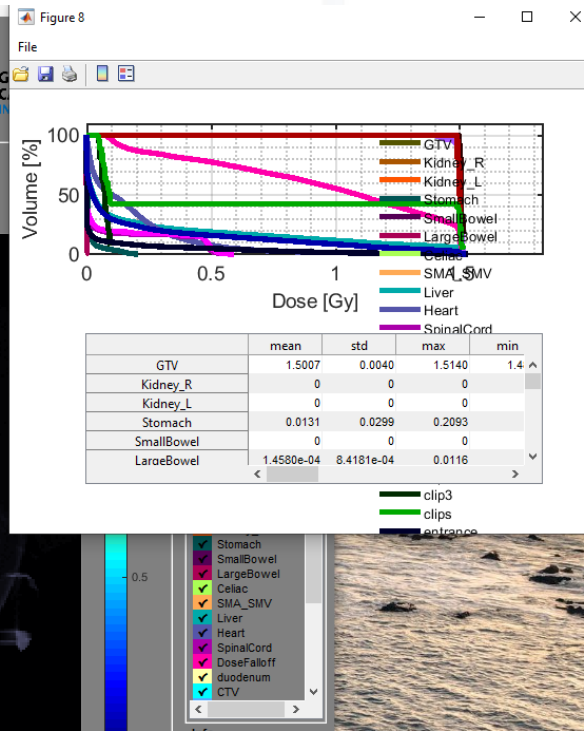
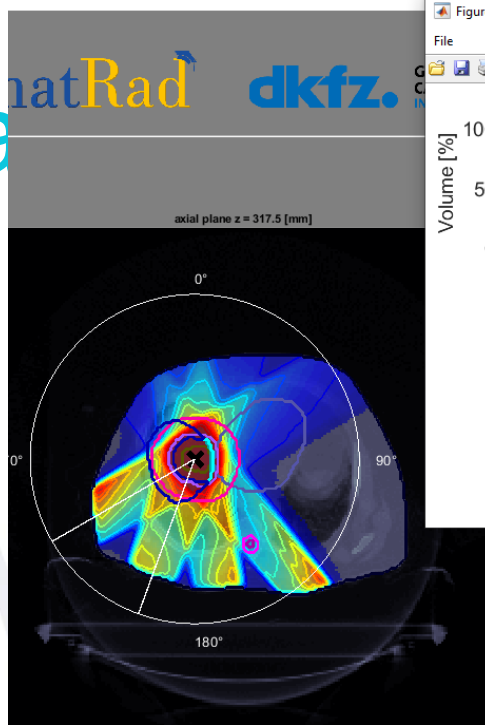
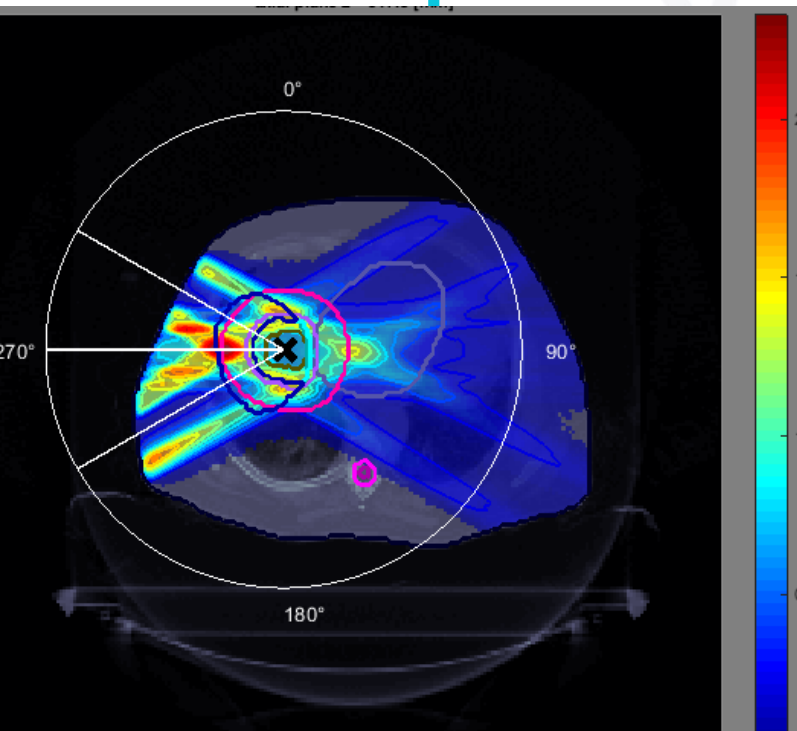
every case

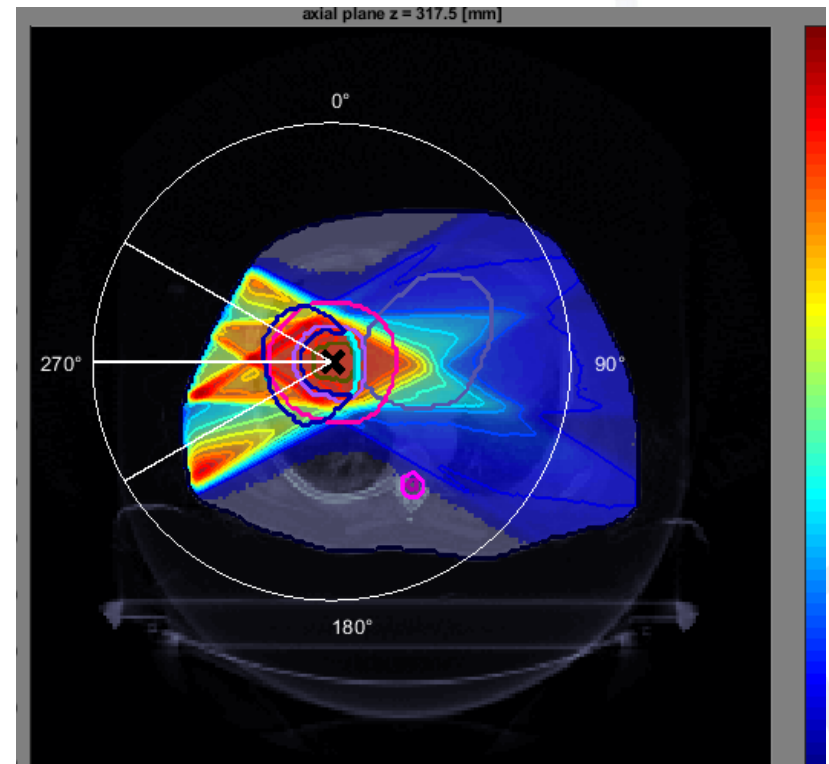
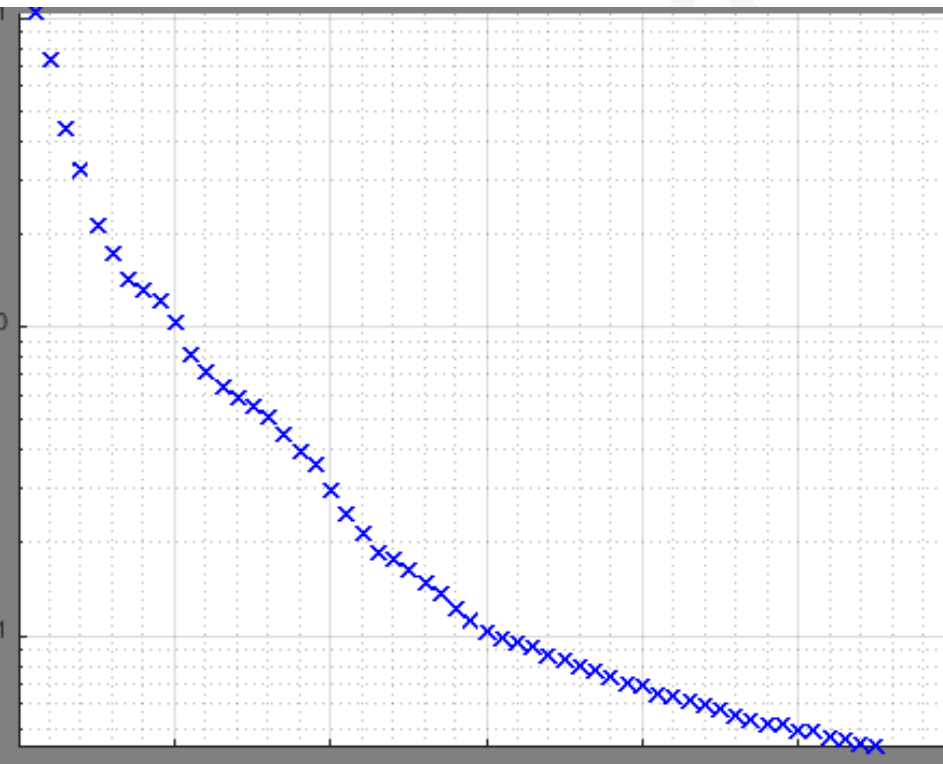
Large-scale Analysis



Large-scale Analysis







Workflow

Refresh Load *.mat data Load DICOM Import from Binary

Status

Plan

boxel width in [mm] 5

Gantry Angle in ° 0 180 90 270

Couch Angle in ° 0 0 0 0

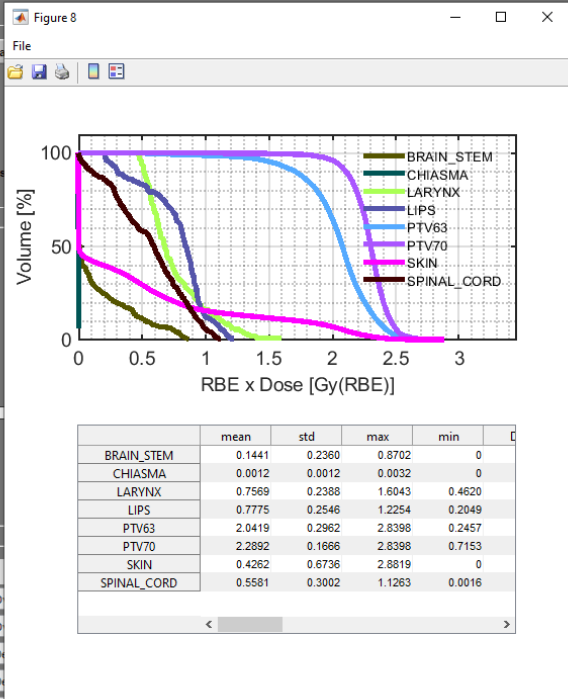
Radiation Mode protons

Machine Generic

IsoCenter in [mm] 255.4 210.3 138.5

Fractions 30

Type of optimization const_RBExD



Objectives & constraints

+/-	VOI name	VOI type	OP	
-	PAROTID_LT	OAR	1	Squared O
-	PAROTID_RT	OAR	1	Squared O
-	PTV63	TARGET	2	Squared D
-	PTV70	TARGET	1	Squared D
-	SKIN	OAR	3	Squared Overdosing
+	BRAIN_STEM			

Visualization

Plane Selection: axial

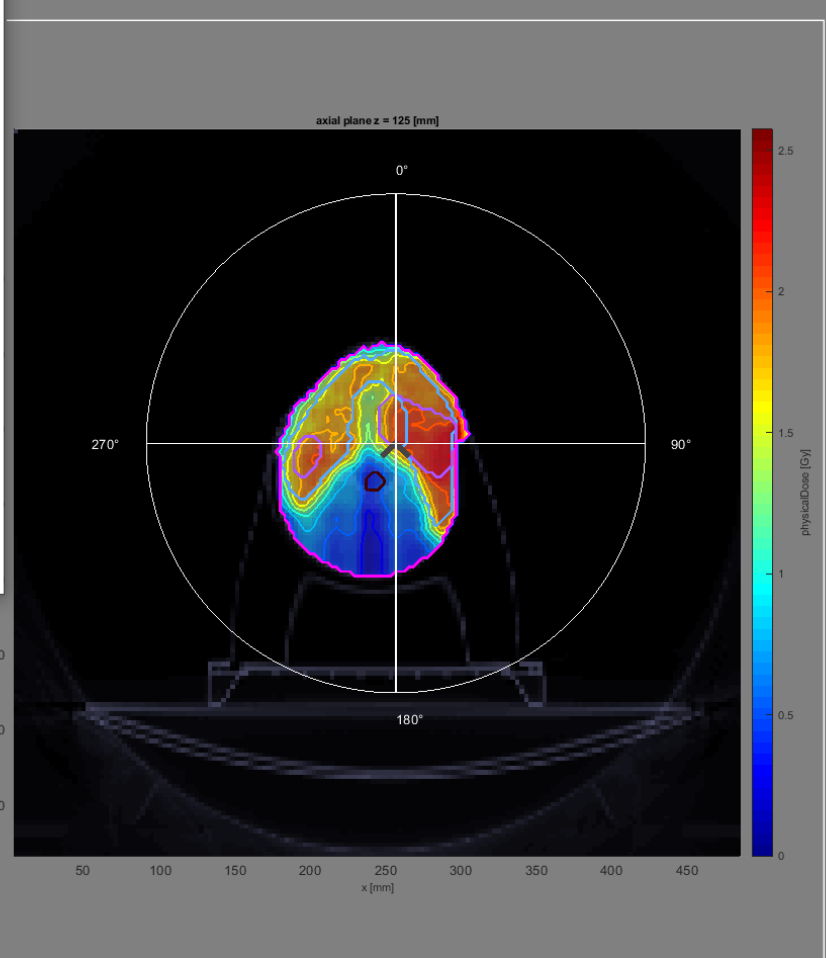
Display option: physicalDose

GoTo: lateral

Open 3D-View

Show DVH/QI

plot CT
 plot contour
 plot isolines
 plot dose
 plot isolines labels
 plot iso center
 visualize plan / beams



min value: 0
max value: 2.5756

Set IsoDose Levels

Viewer Options

Result (i.e. dose)

Window Preset: Custom

Window Center: 1.29

Window Width: 2.58

Range: 0 2.576

jet

Lock Settings

Dose opacity: 0

Structure Visibility

- BRAIN_STEM
- BRAIN_STEM_PRIV
- CEREBELLUM
- CHIASMA
- CTV63
- GTV
- LARYNX
- LENS_LT
- LENS_RT
- LIPS
- OPTIC_NRV_LT
- OPTIC_NRV_RT
- PAROTID_LT
- PAROTID_RT
- PTV63
- PTV70
- SKIN
- SPINAL_CORD_PRIV
- TEMP_LOBE_LT
- TEMP_LOBE_RT
- TM_JOINT_LT

Info

v2.10.1 "Blaise"

www.matRad.org

About

matRadGUI

Workflow

Refresh Load *.mat data Load DICOM Import from Binary

Plan

bixel width in [mm] 5
 Gantry Angle in ° 0 180 90 270
 Couch Angle in ° 0 0 0
 Radiation Mode protons
 Machine Generic
 IsoCenter in [mm] 250.4 205.3 138.5
 # Fractions 30
 Type of optimization const_RBExD

Objectives & constraints

+-	VOI name	VOI type	OP	
-	PAROTD_LT	OAR	1	Squ
-	PAROTD_RT	OAR	1	Squ
-	PTV63	TARGET	2	Squ
-	PTV70	TARGET	1	Squ
-	SKIN	OAR	3	Squ
+	BRAIN_STEM			

Visualization

Slice Selection Type of plot intensity GoTo lateral plot CT plot contour plot isolines plot dose plot isolines labels plot iso center visualize plan / beams

Beam Selection Plane Selection axial Open 3D-View

Offset Display option RBExDose Show DVH/QI

Figure 9

	mean	std	max	min
BRAIN_STEM	0.1542	0.2374	0.9464	0
CHIASMA	0.0013	0.0016	0.0048	0
LARYNX	0.7788	0.3244	1.8550	0.4371
LIPS	0.8259	0.2227	1.3645	0.2066
PTV63	2.1170	0.1984	2.5756	0.4424
PTV70	2.3216	0.0721	2.5756	0.7617
SKIN	0.4269	0.6816	2.5756	0
SPINAL_CORD	0.5372	0.2591	1.0207	0.0081

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axial plane z = 145 [mm]

min value: 0
max value: 2.5756

Viewer Options

Result (i.e. dose) Window Preset Custom Window Center: 1.29 Window Width: 2.58 Range: 0 2.576 jet Lock Settings Dose opacity: 1 Structure Visibility

- BRAIN_STEM
- BRAIN_STEM_PRV
- CEREBELLUM
- CHIASMA
- CTV63
- GTV
- LARYNX
- LENS_LT
- LENS_RT
- LIPS
- OPTIC_NRV_LT
- OPTIC_NRV_RT
- PAROTD_LT
- PAROTD_RT
- PTV63
- PTV70
- SKIN
- SPINAL_CORD
- SPINAL_CORD_PRV
- TEMP_LOBE_LT
- TEMP_LOBE_RT
- TM_JOINT_LT

Info v2.10.1 "Blaise" www.matRad.org About

Result

- Difference between beams (photons, protons and carbon)
- Difficulties of particle therapy planning
 - Treatment planning
 - Impact of uncertainties