

Particle therapy masterclass

THERAPY PLANING


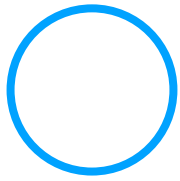
- WARSAW UNIVERSITY OF TECHNOLOGY

STUDENTS FROM WARSAW, GDAŃSK, PIASTÓW
AND ZĄBKI





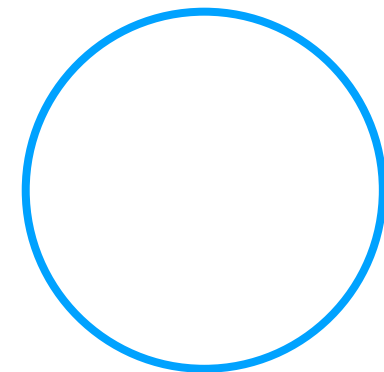
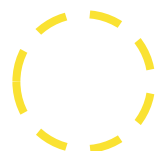
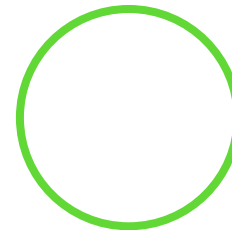
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ABSTRACT

We have made multiple simulations of radiotherapy for various phantoms, eg. liver, head and neck and TG119. We used multiple kinds of beams including photons, protons, and carbon.

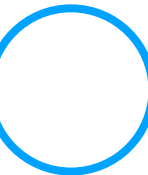
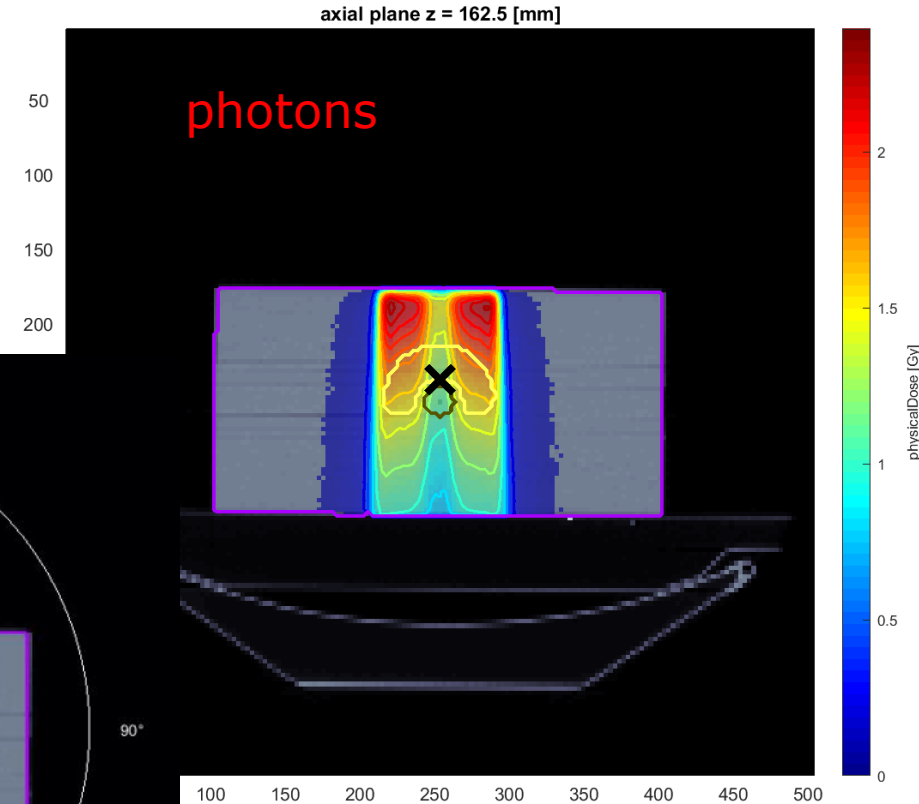
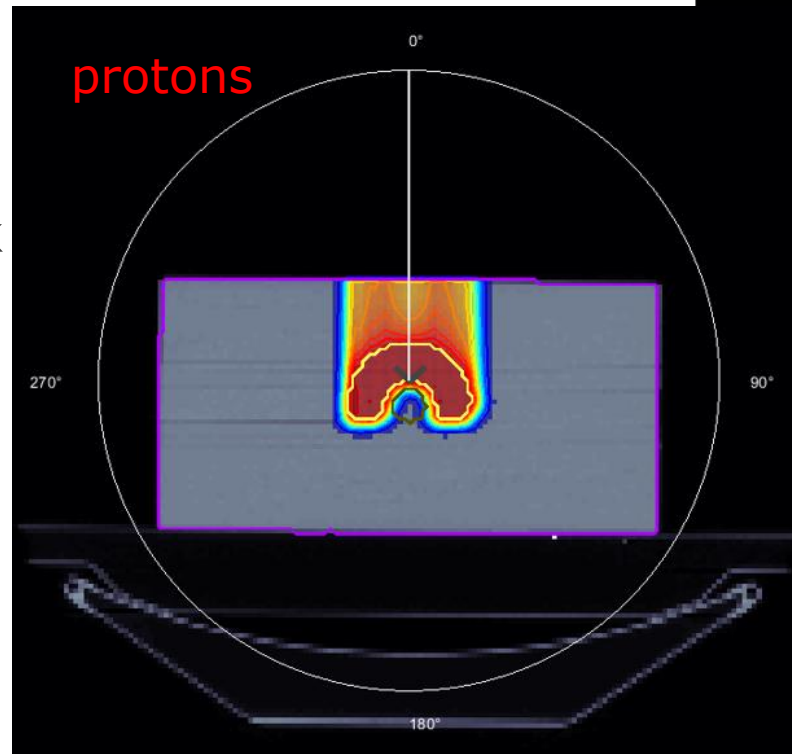


COMPARISON OF SINGLE BEAM PHOTON AND PROTON FOR TG119 PHANTOM

Here we compared the use of photons and protons in our phantom.

Conclusions:

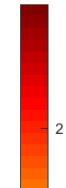
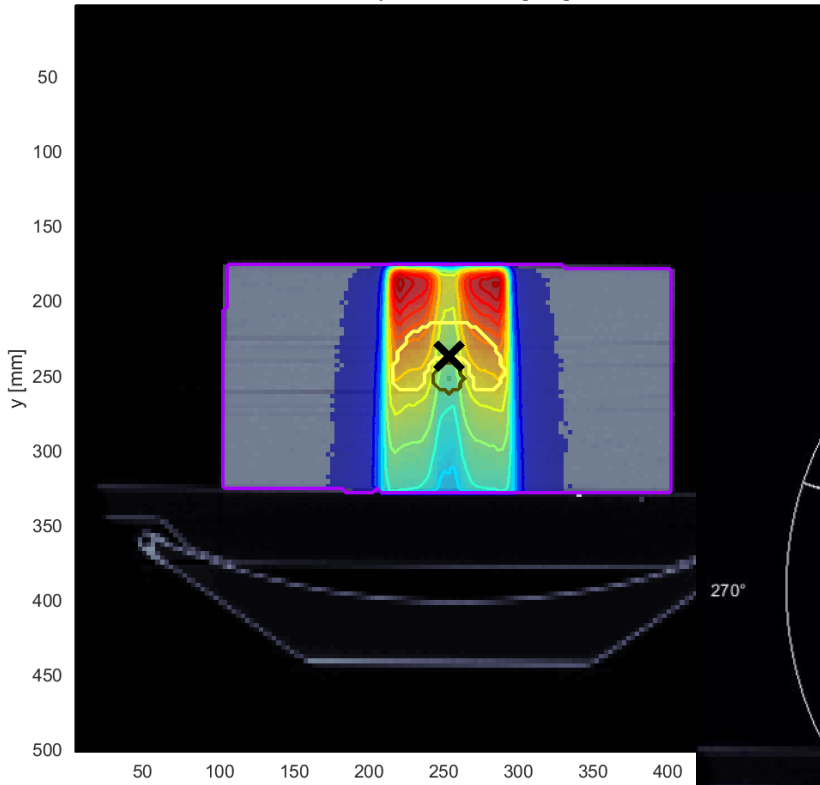
- proton beam more focused
- less invasive for cells at risk
- single photon beam deposits larger damage under skin instead in the target



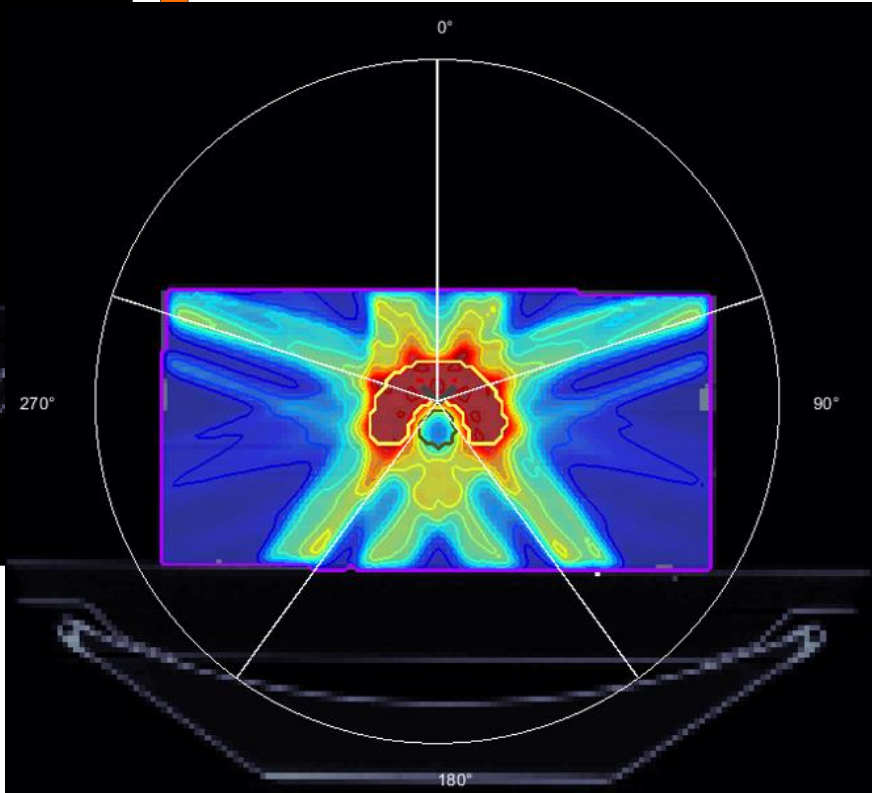
COMPARISON OF SINGLE PHOTON BEAM VS FIVE BEAMS FOR TG119 PHANTOM



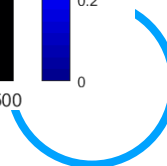
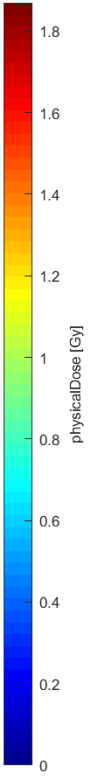
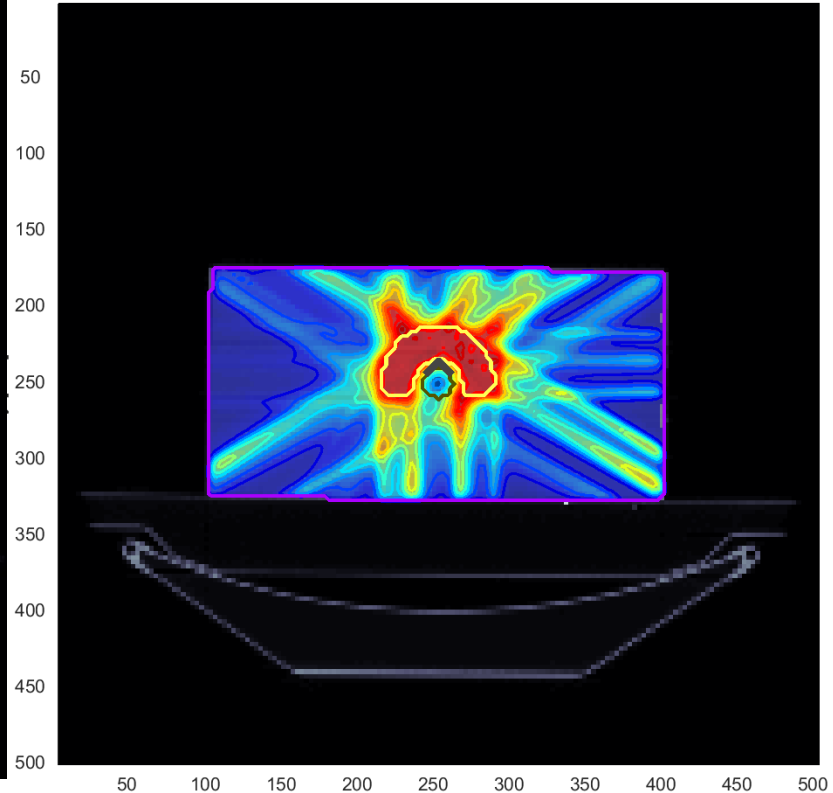
axial plane z = 162.5 [mm]



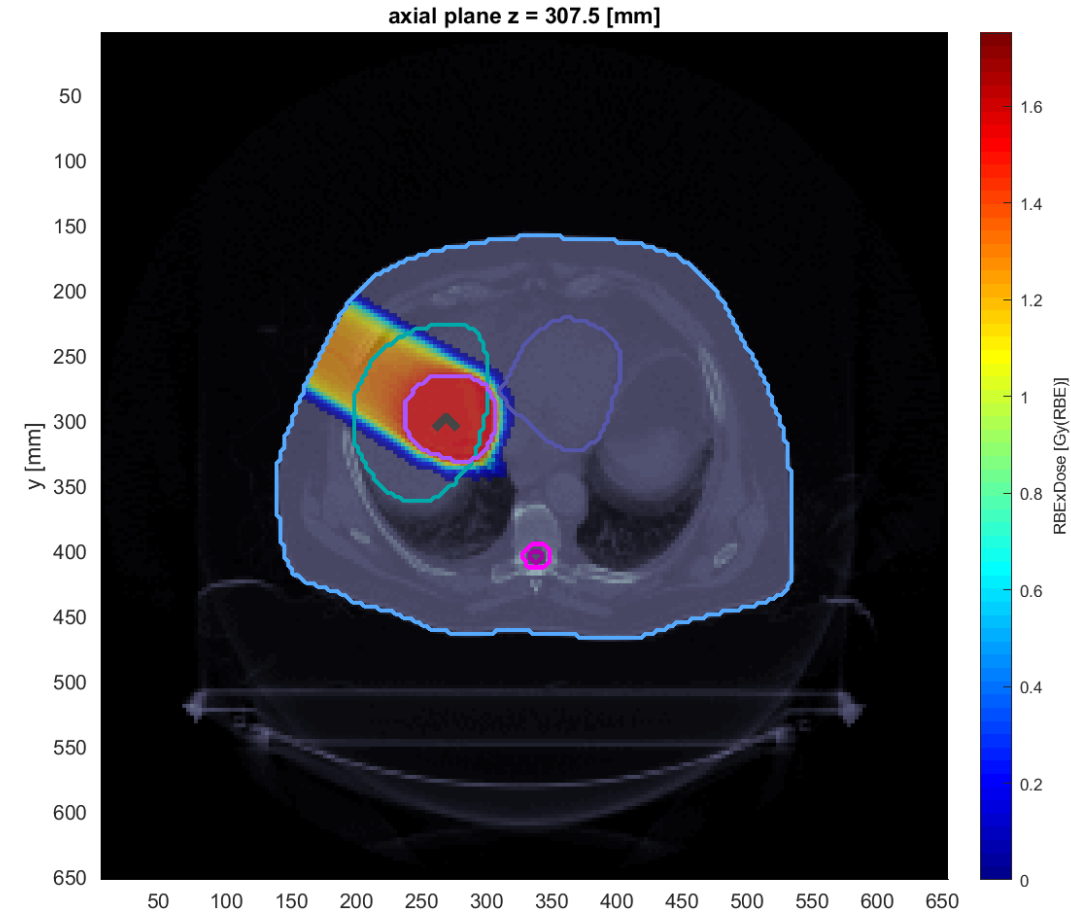
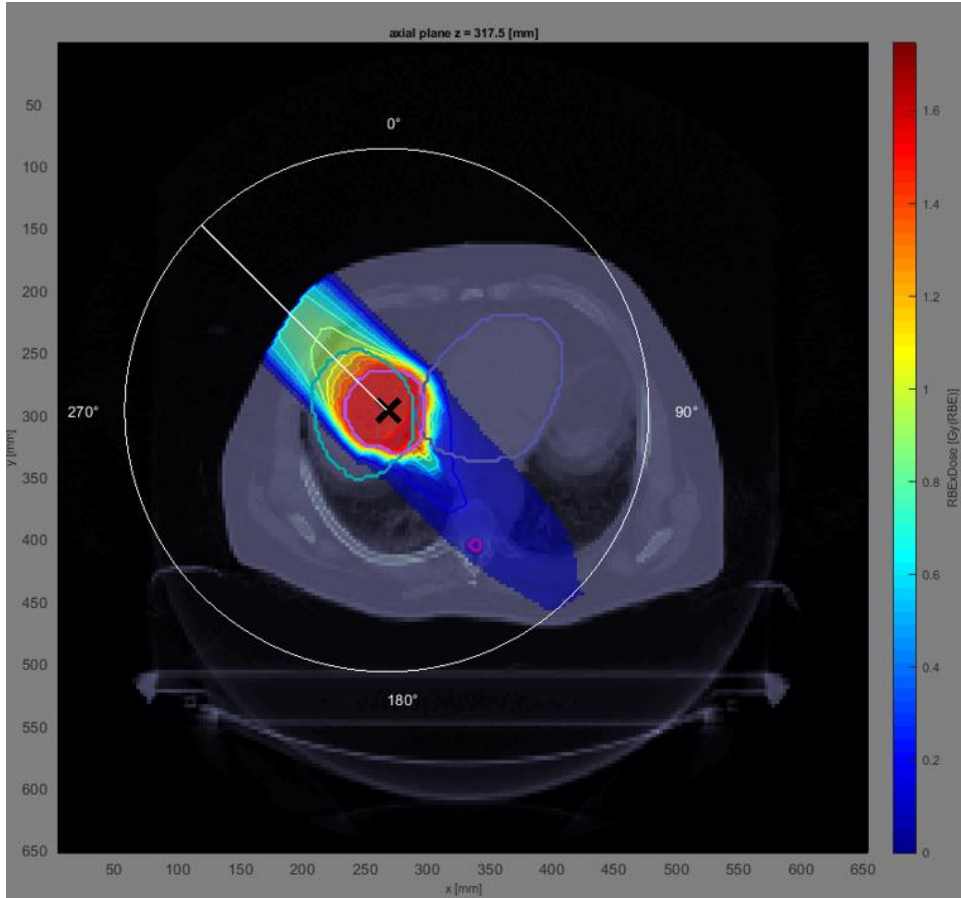
Multiple photon beams give more precise results than a single photon beam.



axial plane z = 135 [mm]

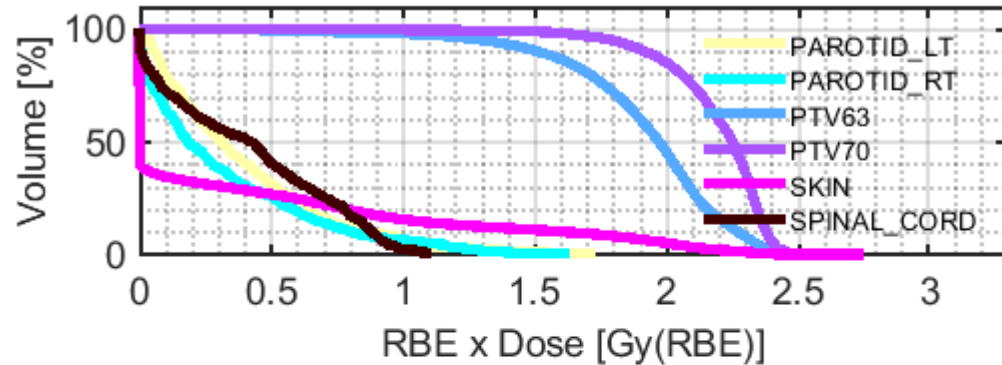


LIVER

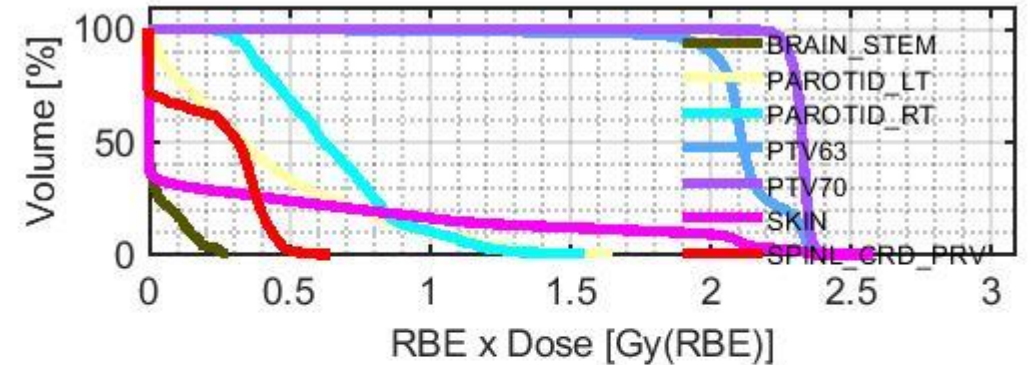


Thanks to Bragg's peak healthy tissues and organs at risk were better spared than when using carbon ions. On the other hand, carbon ions leave tissues in front of PTV target less damaged.

ISOCENTER DISPLACEMENT – HEAD-NECK



	mean	std	max	min
PAROTID_LT	0.3985	0.3352	1.7358	0.0016
PAROTID_RT	0.3192	0.3432	1.6342	0
PTV63	1.9112	0.3335	2.7488	0.0715
PTV70	2.1868	0.2217	2.7488	0.4194
SKIN	0.3776	0.6519	2.7488	0
SPINAL_CORD	0.4157	0.3306	1.1079	0


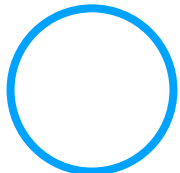


	mean	std	max	min
BRAIN_STEM	0.0382	0.0666	0.2827	
PAROTID_LT	0.4293	0.3679	1.6534	0.002
PAROTID_RT	0.6541	0.2476	1.5565	0.149
PTV63	2.1169	0.1990	2.5765	0.354
PTV70	2.3188	0.0707	2.5765	0.765
SKIN	0.3761	0.6950	2.5765	

Even a small error in patient's positioning (~1 cm) causes a significant difference between planned and delivered doses



CONCLUSIONS

- Multiple photon beams are required to achieve an acceptable dose distribution
 - Proton beam allows us to protect organs at risk with better precision
 - Carbon beams are similar to proton beams but the dose distribution is wider
 - Placement of the patient matters
- 
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A decorative graphic featuring a thick pink arc that curves across the top and sides of the page. In the top left, there is a dashed orange circle. In the top right, there is a dashed green circle. A small yellow dot is located on the left side of the pink arc. A small cyan dot is located on the right side of the pink arc. In the bottom right, there is a solid blue circle. The text "Thank you for your attention" is centered in a black, sans-serif font.

Thank you
for your
attention