



Raypilot vs Gold Markers

Johannes Berchtold
Universitätsklinik für Radiotherapie und Radio-Onkologie, Salzburger Landeskliniken, Müllner Hauptstraße 48, 5020 Salzburg,
Austria.

RayPilot Usermeeting - 2023

Methods

- 12 Patients (metastatic á 6x6 Gy)
- 64 Fractions
- kV-Images
- Gold Markers
- HypoCath with fixation

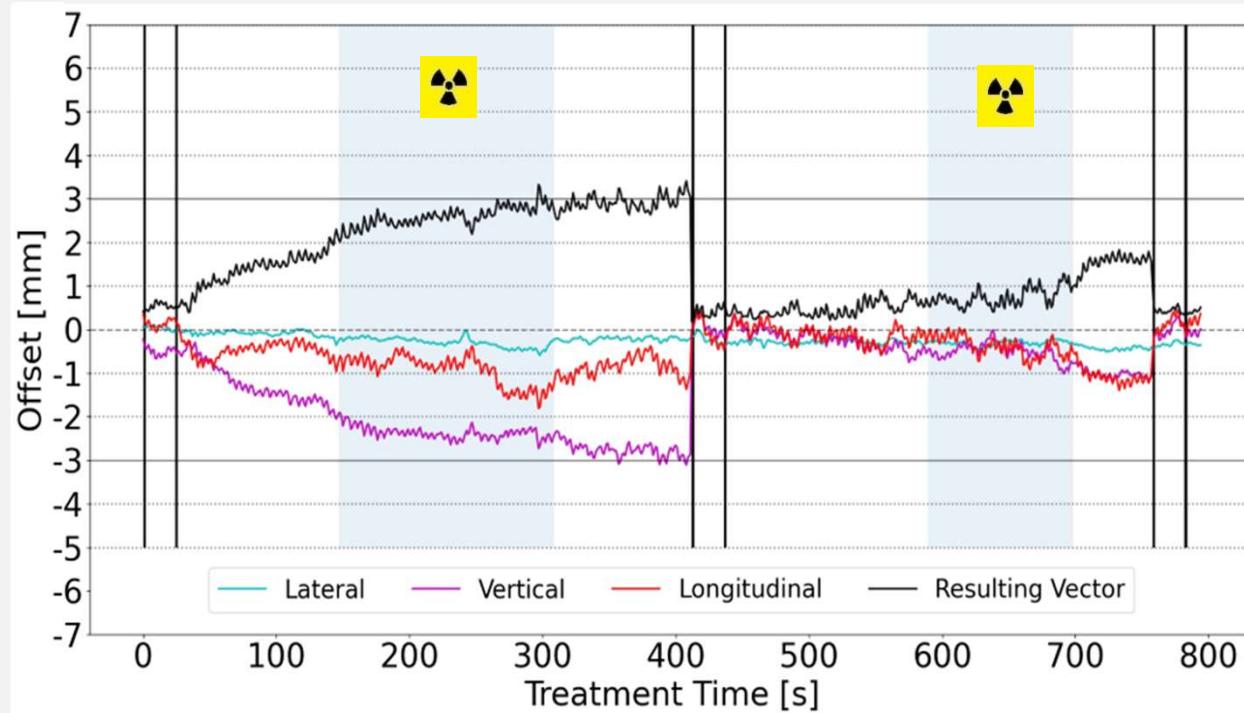


Prerequisites

Demanding the HypoCath to act as a substitution for gold-marker IGRT requires:

- HypoCath system measures the same offset as the kV-IGRT system
- Inter - and Intrafractional stability within the urethra
 - Only axial stability was monitored

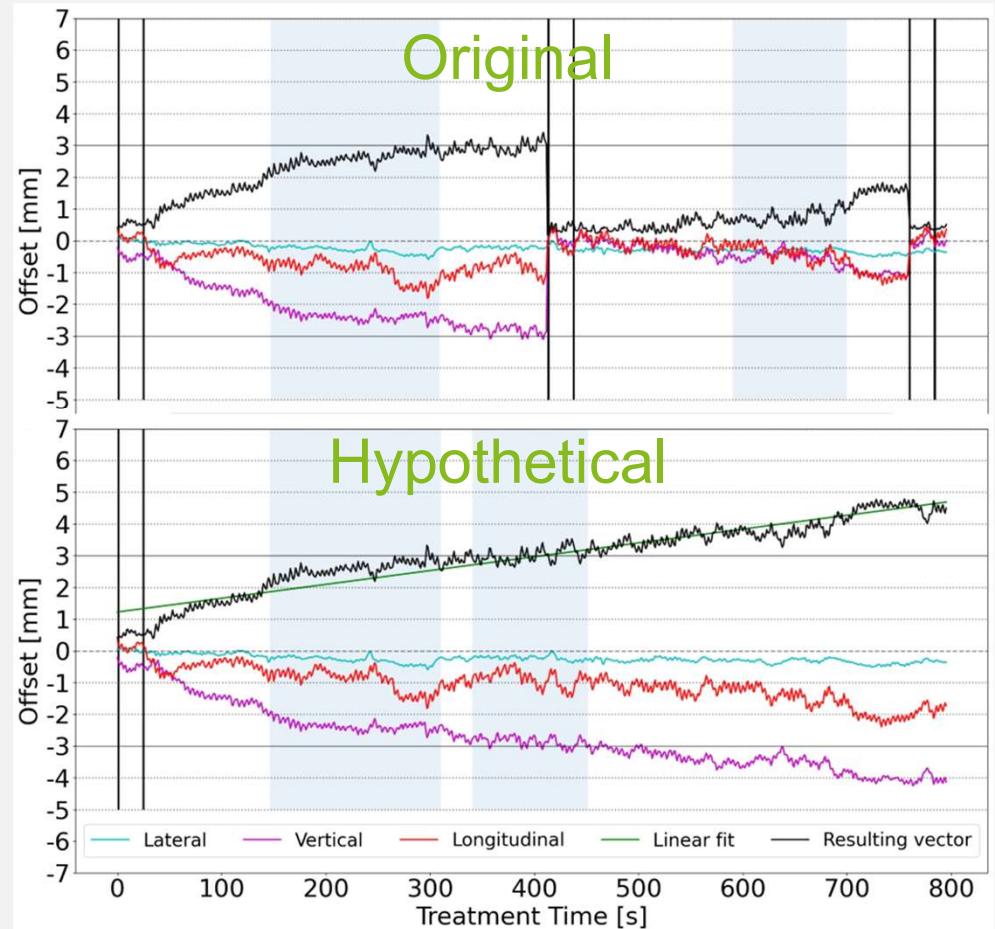
Where to get the data - Database



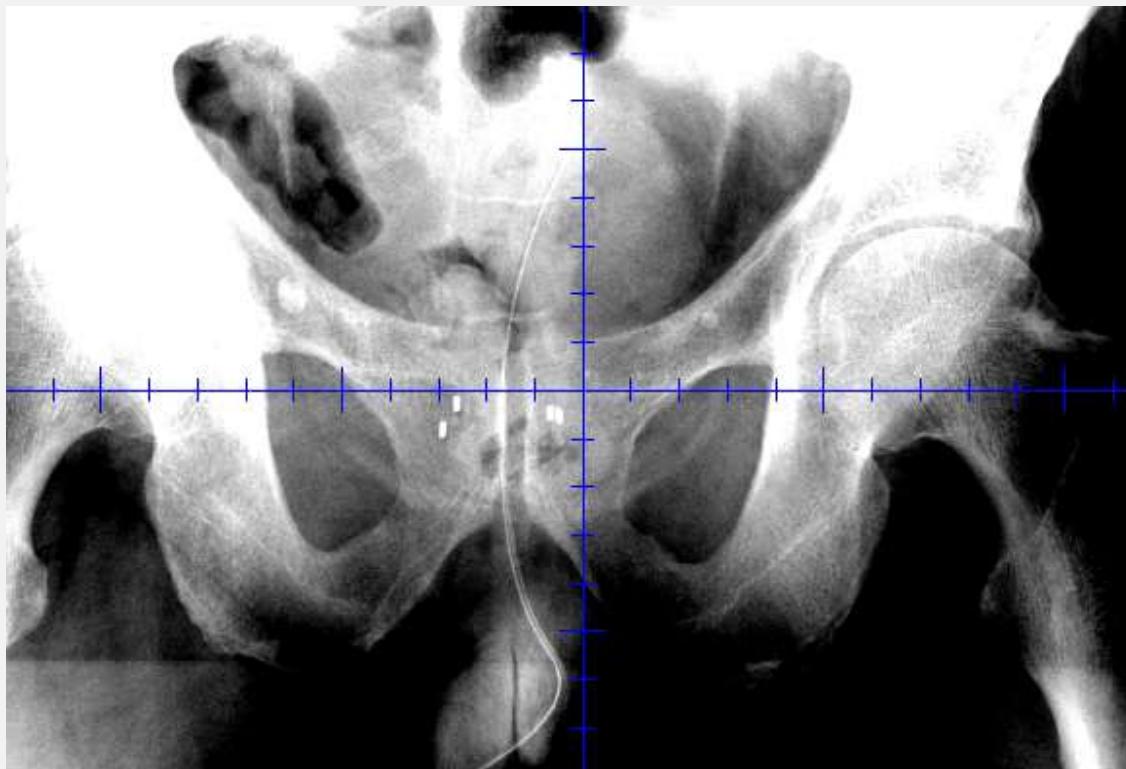
- Data is stored in SQL Database
- Python skript to vizualize and analyse motion
- Allows creating hypothetical fractions
(without HypoCath)

Hypothetical Fractions

- Without any interruptions
- Overall treatment time is shorter
- Since movement correlates with time – less movement

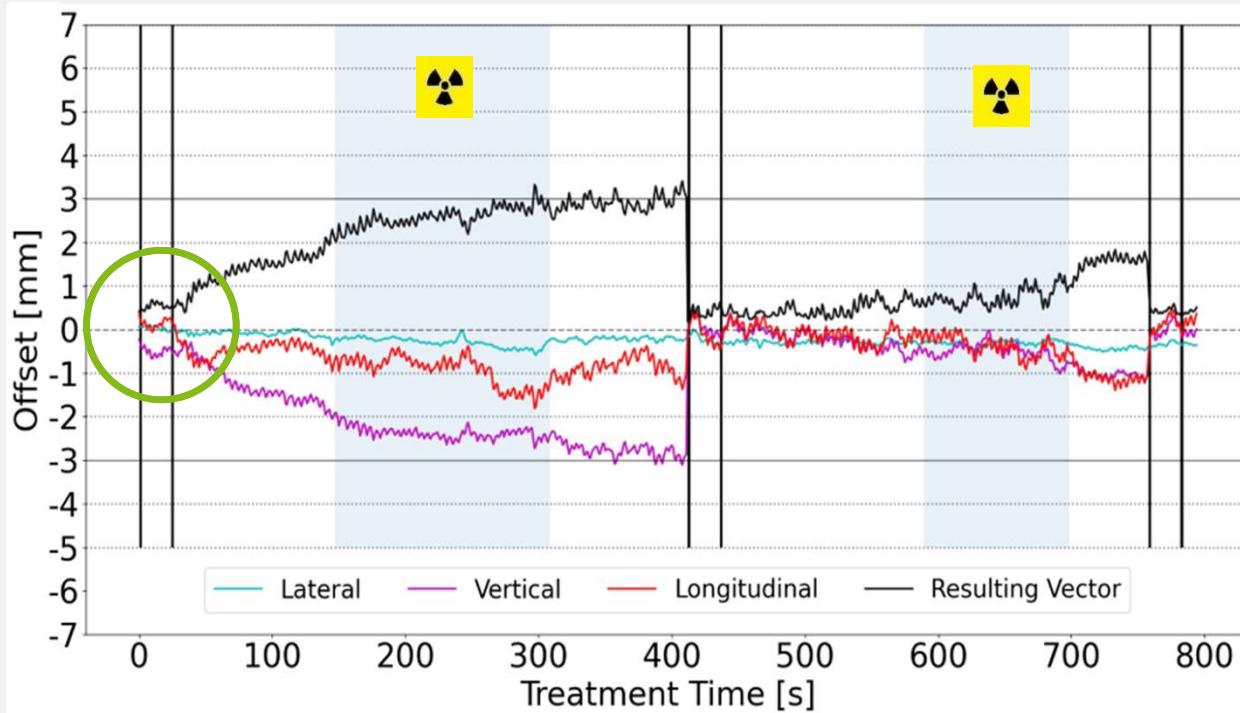


Where to get the data - Images



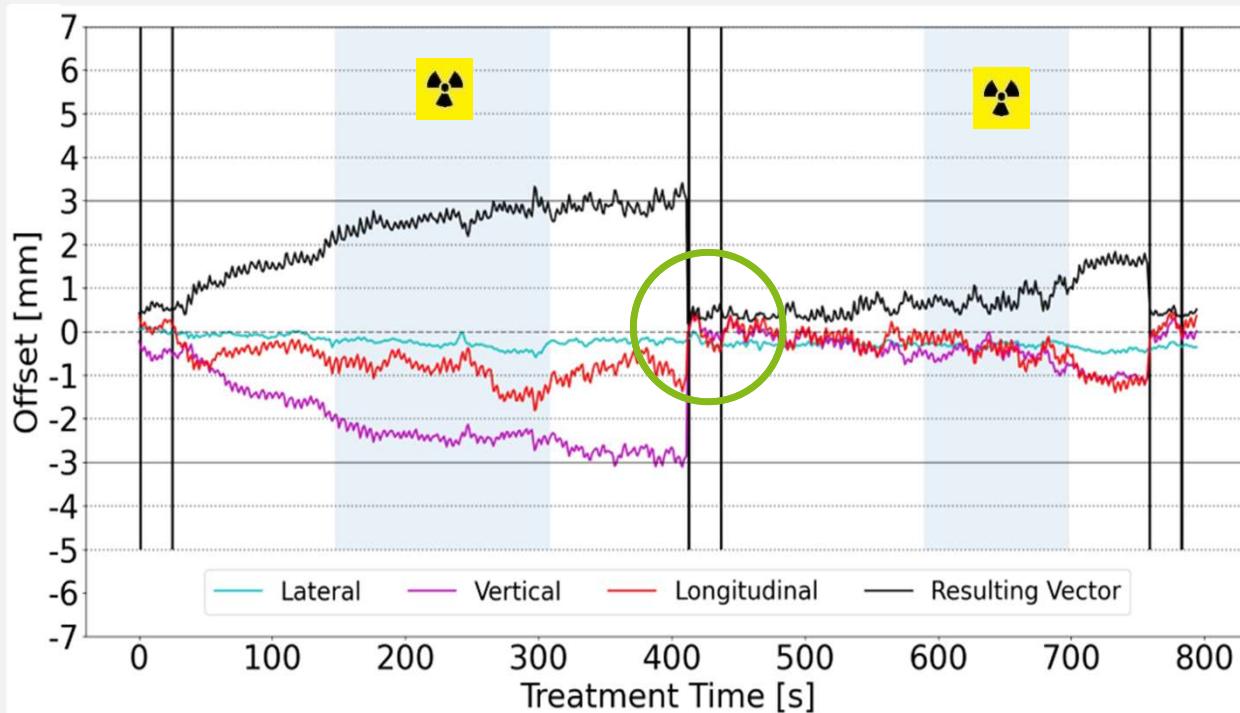
- kV-images at 180° were superimposed for inter-and intrafractional stability
- image pairs at 180° and 130° were used to evaluate accuracy of motion-detection
- Images are referenced to HypoCath-interactions using a timestamp

Initial kV-image pair



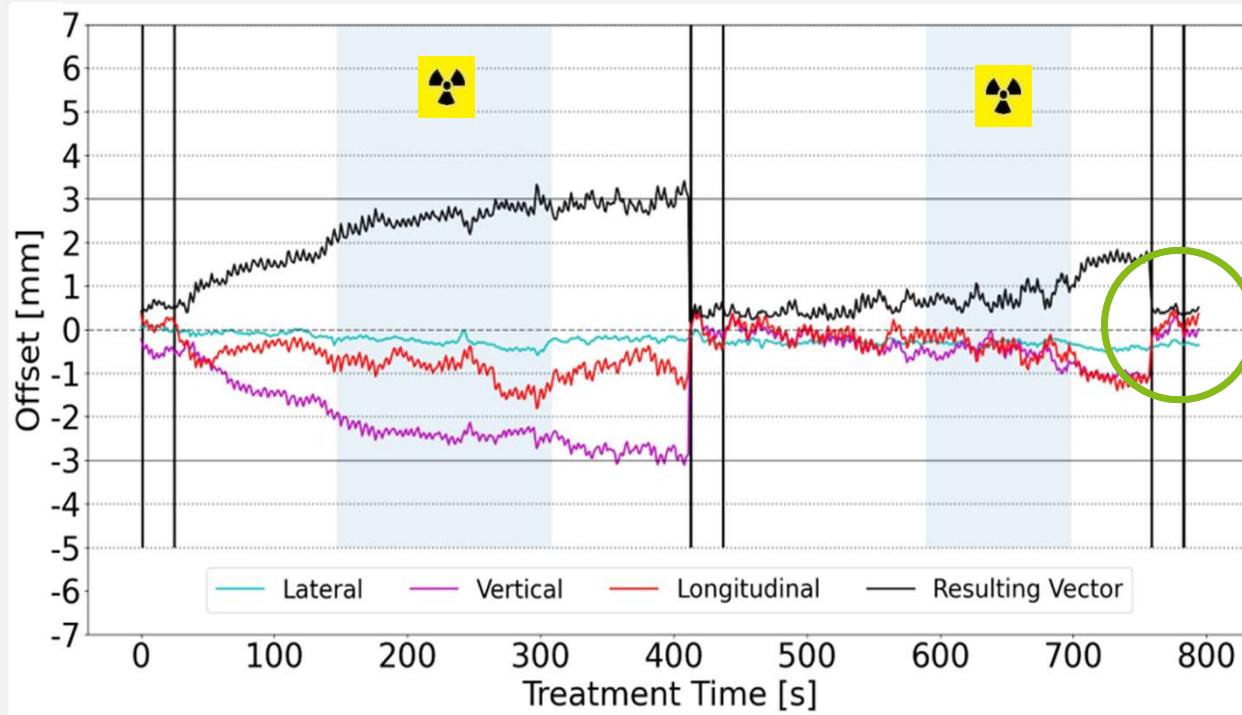
- Used for interfractional catheter stability (all first images)
- Images taken at 180° were evaluated

Intermediate kV-image pair(s)



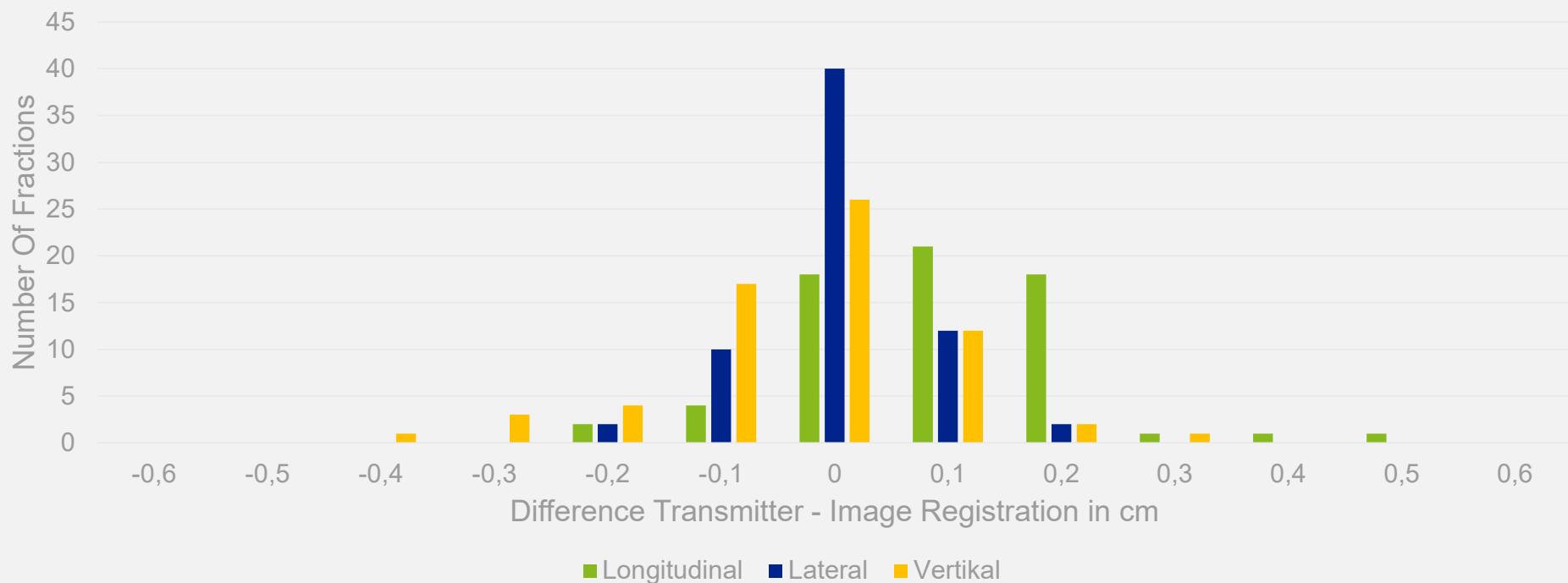
- Used for repositioning
- Allows evaluation prostate motion parameters recorded by the HypoCath system compared to IGRT-based values
- Compared with first image to evaluate catheter stability

Final kV-image pair

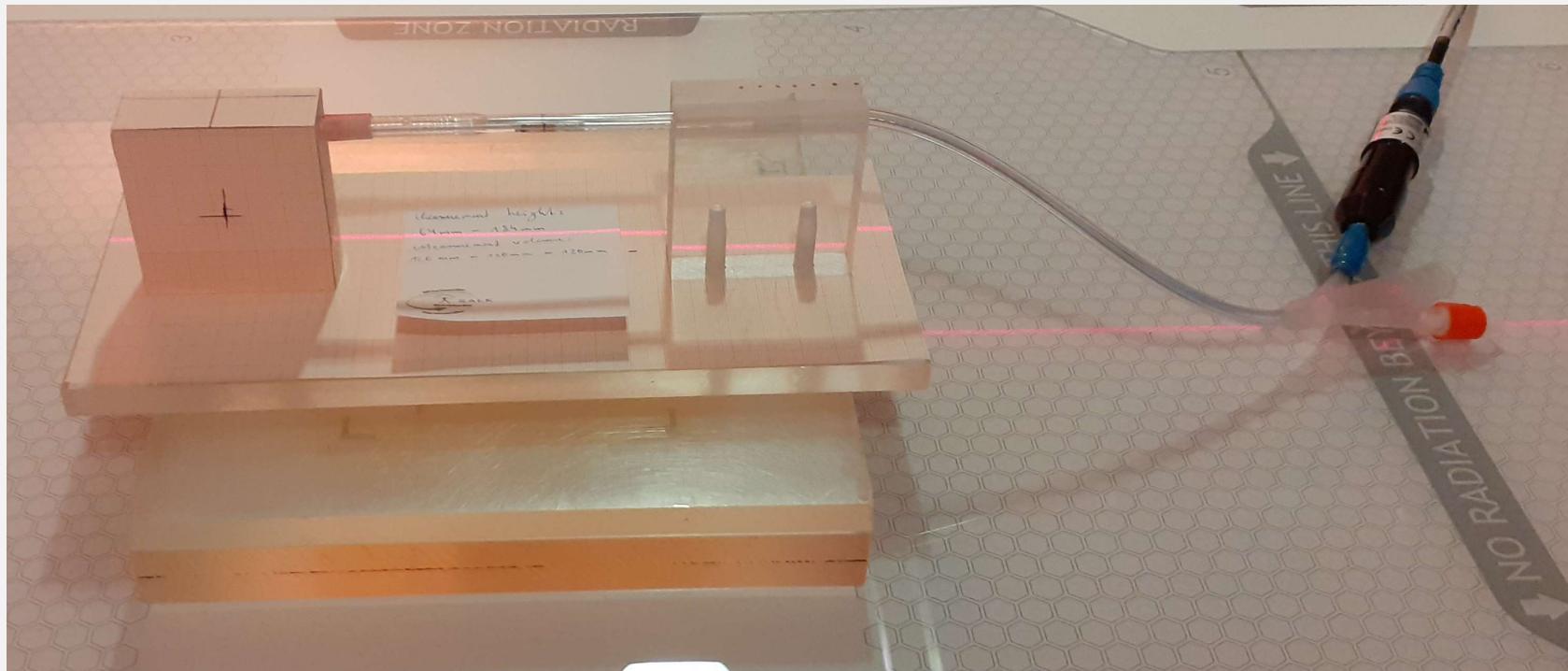


- Acquired after treatment
- Compared with first image pair to determine intrafractional catheter stability

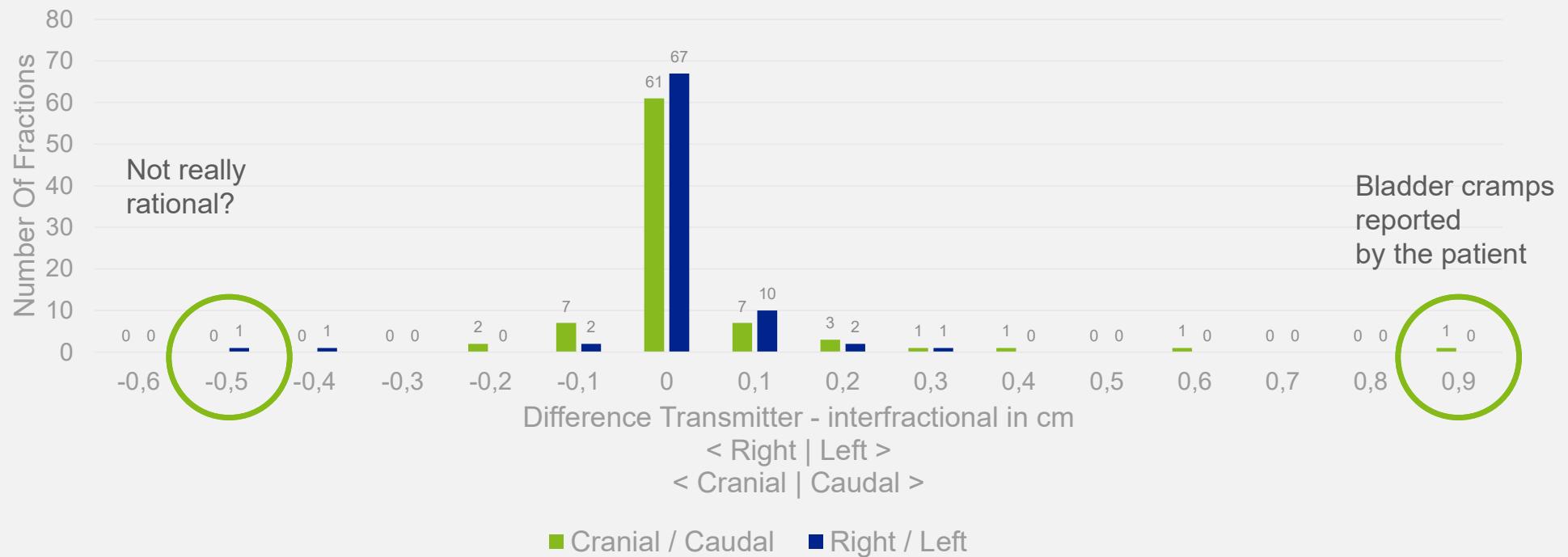
Difference Transmitter – GM-IGRT



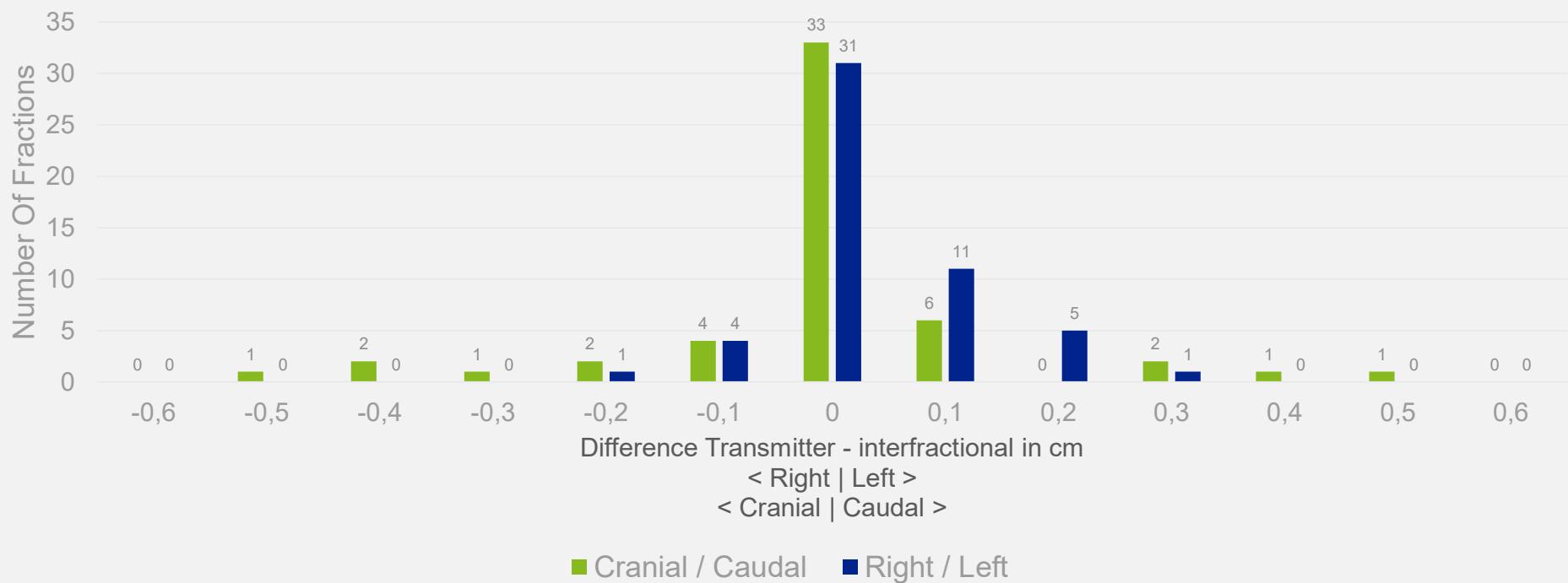
Difference Transmitter – GM-IGRT: Phantom measurements



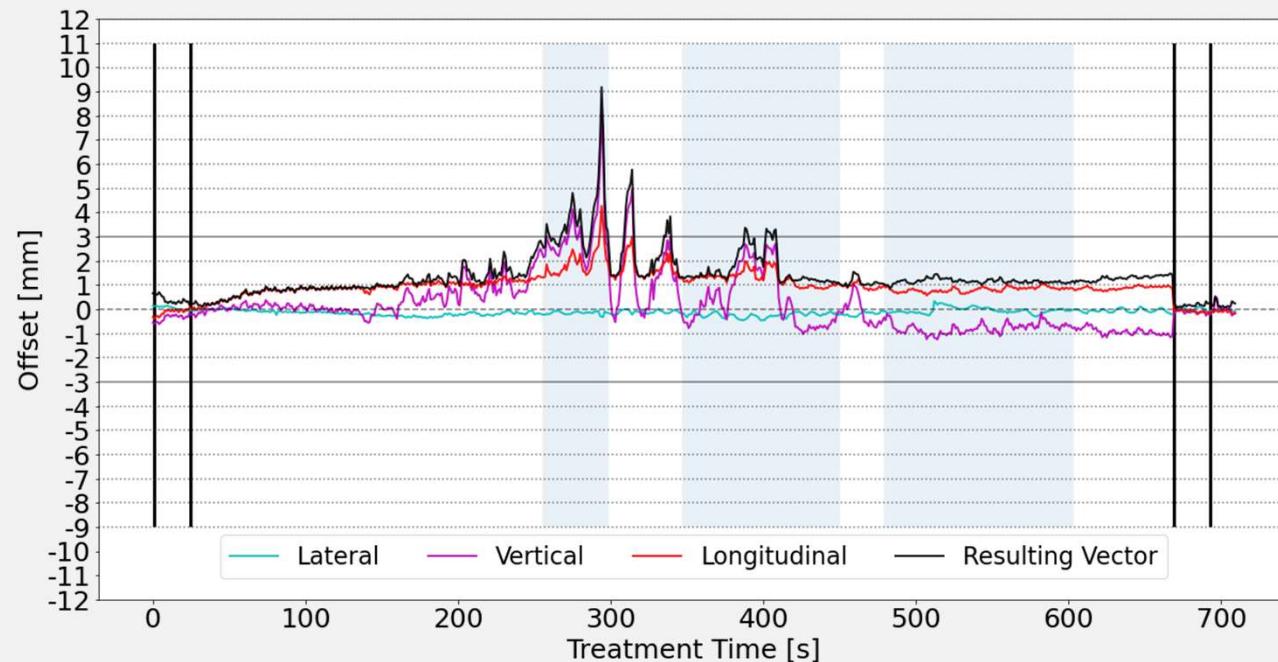
Intrafractional Stability



Interfractional Stability



Accuracy...

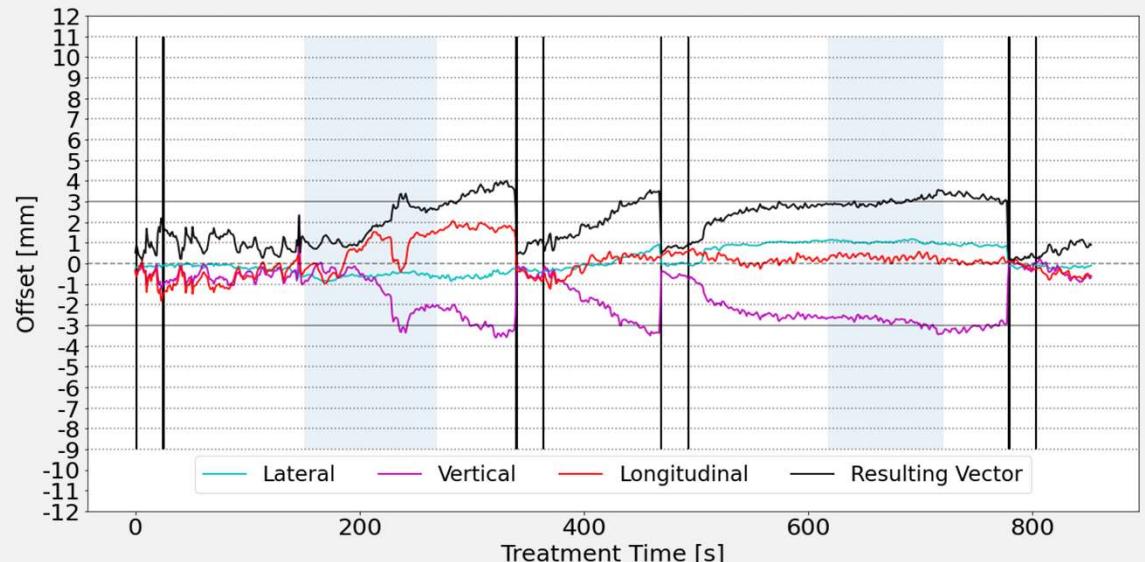


... is about timing it right

Accuracy...

- Imaging takes a lot of time – CBCT vs kV

- Compensating prostate movement directly by controlling the treatment couch via RayPilot saves time
- FFF decreases beam-on time



... is all about time

Coming back to Accuracy

- The same actions to keep the data as valid as possible also guarantee more precise treatment – without and with HypoCath
 - letting patients rest one or two minutes after taking place on the treatment couch
 - forcing patients to drink too huge amounts of water increases the chance of bladder cramps – patients contract muscles to control their urge to urinate – yields in position inaccuracies
 - but when treatment has started: as fast as possible

Thank You