



RadioOnkologie



Behandeln
Forschen
Lehren

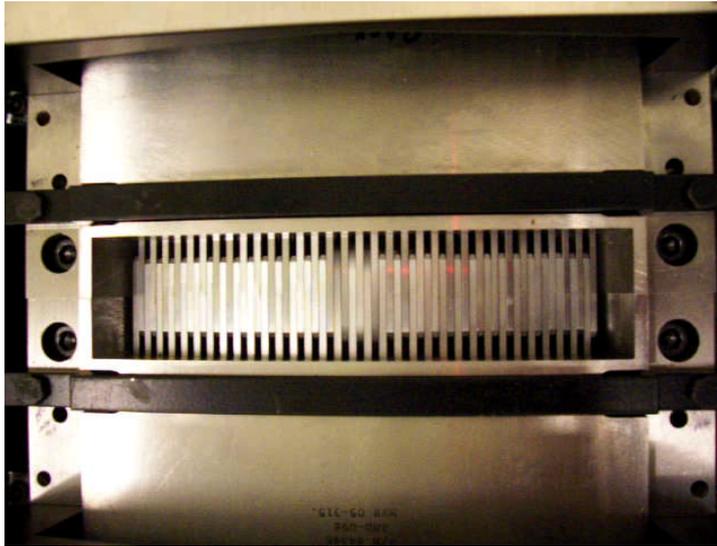
UniversitätsKlinikum Heidelberg

Tomotherapie: Physikalische Aspekte

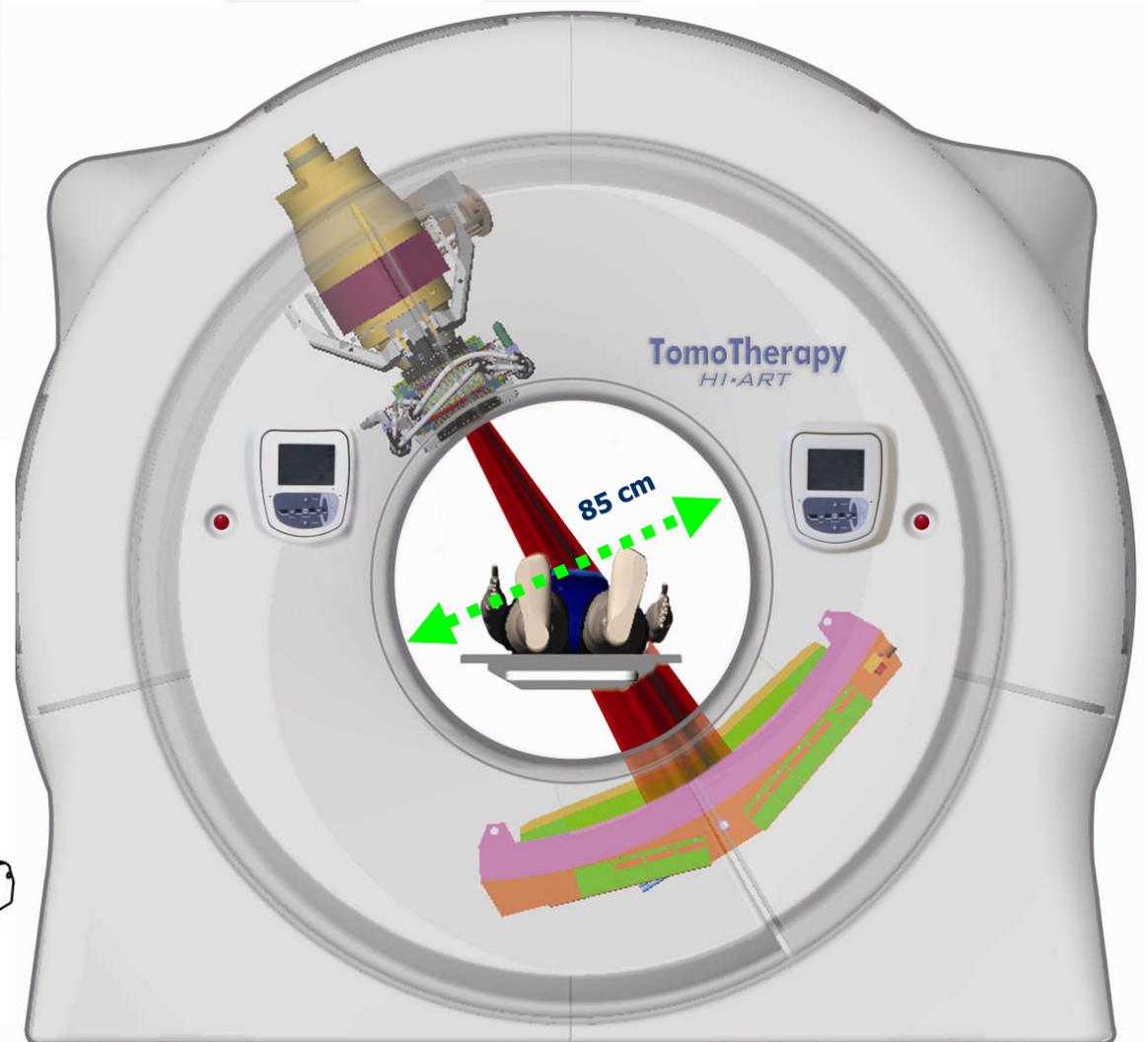
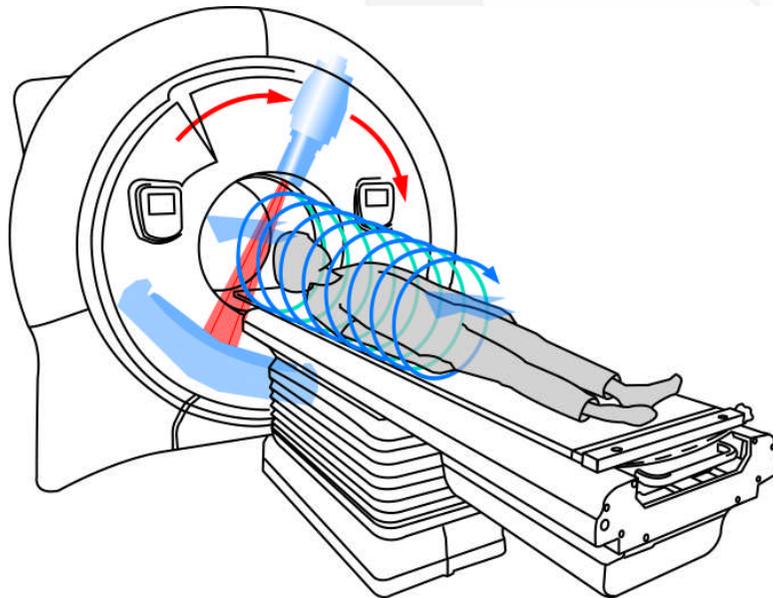
Kai Schubert



Allgemein



Binärer MLC mit 64 Leaves (40cm Feldbreite)
Feldlängen 1cm, 2.5cm, 5cm
Max. Bestrahlungslänge 160cm
Fokus-Isozentrum 85cm





Inverse Planung anhand von Constraints

ROIs Optimization Fractionation Delivery QA Setup Delivery QA Analysis

Prescription

% Vol
 Stats For PTV the median dose will be ... **45.0 Gy**

Field Width: 2.48 cm - Jaws(1.0,-1.0) Pitch: 0.287 Dose Calc Grid: Fine Batch beamlets

Tumor Constraints

Name	Display	Color	Blocked	Use?	Importance	Max Dose [G]	Max Dose Per	DVH Vol [%]	DVH Dose [G]	Min Dose [G]	Min Dose Per
PTV	<input checked="" type="checkbox"/>	Red	None	<input checked="" type="checkbox"/>	10	45.0	100	50.0	45.0	45.0	100
boost	<input checked="" type="checkbox"/>	Red	None	<input checked="" type="checkbox"/>	10	54.5	100	50.0	54.5	54.5	100

Sensitive Structure Constraints

Name	Display	Color	Blocked	Use?	Importance	Max Dose [Gy]	Max Dose Per	DVH Vol [%]	DVH Dose [Gy]	DVH Pt. Pen.
Lunge li. part	<input checked="" type="checkbox"/>	Blue	None	<input checked="" type="checkbox"/>	1	5.0	3	50.0	3.0	3
Rueckenmark	<input checked="" type="checkbox"/>	Cyan	None	<input checked="" type="checkbox"/>	10	20.0	10	25.0	15.0	10
Niere re	<input checked="" type="checkbox"/>	Green	None	<input checked="" type="checkbox"/>	10	8.0	10	30.0	5.0	10
Niere li.	<input checked="" type="checkbox"/>	Orange	None	<input checked="" type="checkbox"/>	10	8.0	10	30.0	5.0	10

Dose Display

Isodose

58
53
44
40
35
30
25
20

Patient Images

Density Image Viewer

Density Image

Optimize

Mode: Beamlet

Modulation Factor: 2.000

Initiate Full Dose after 20 iterations.

Start
Pause
Resume
Get Full Dose
Cancel

Dose-Volume Histogram - Cumulative Mode Relative

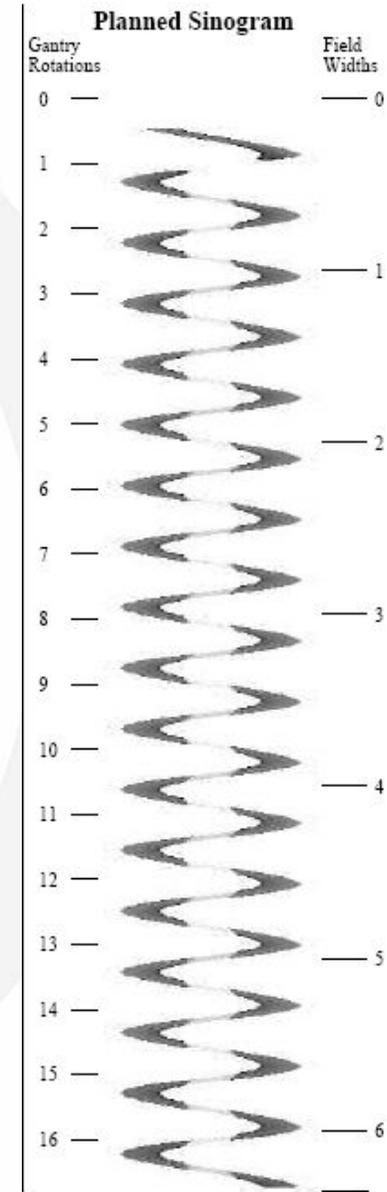
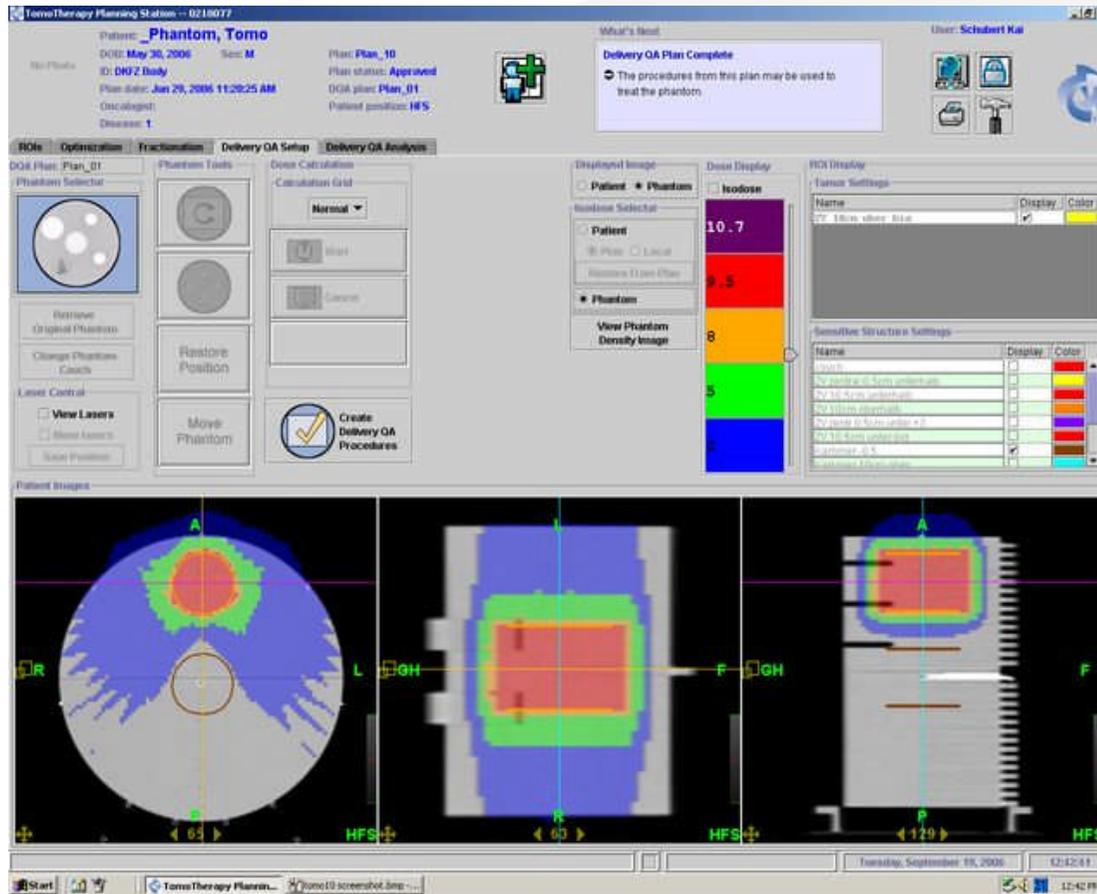
Vol Min < 0.0 > Vol Max < 100.0 Gy Min < 0.0 > Gy Max < 60.0 >

Optimization is executing iteration number 7.

Thursday, October 19, 2006 16:19:04



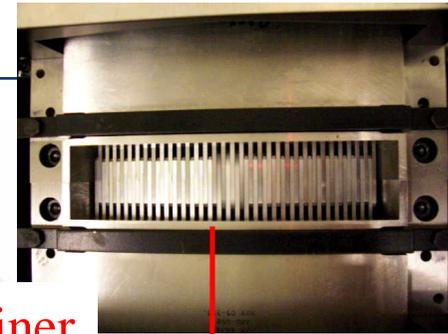
Ergebnis resultiert in einem Sinogramm



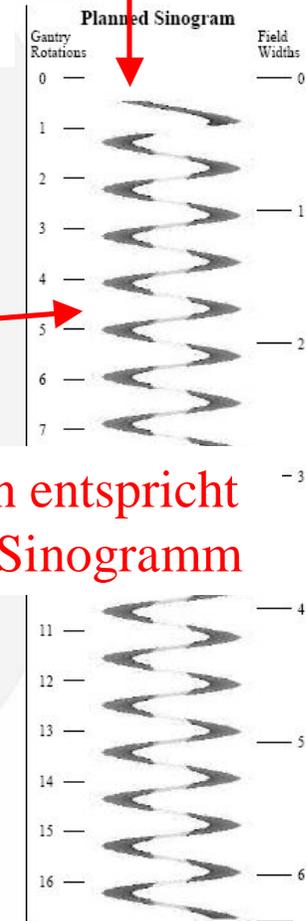
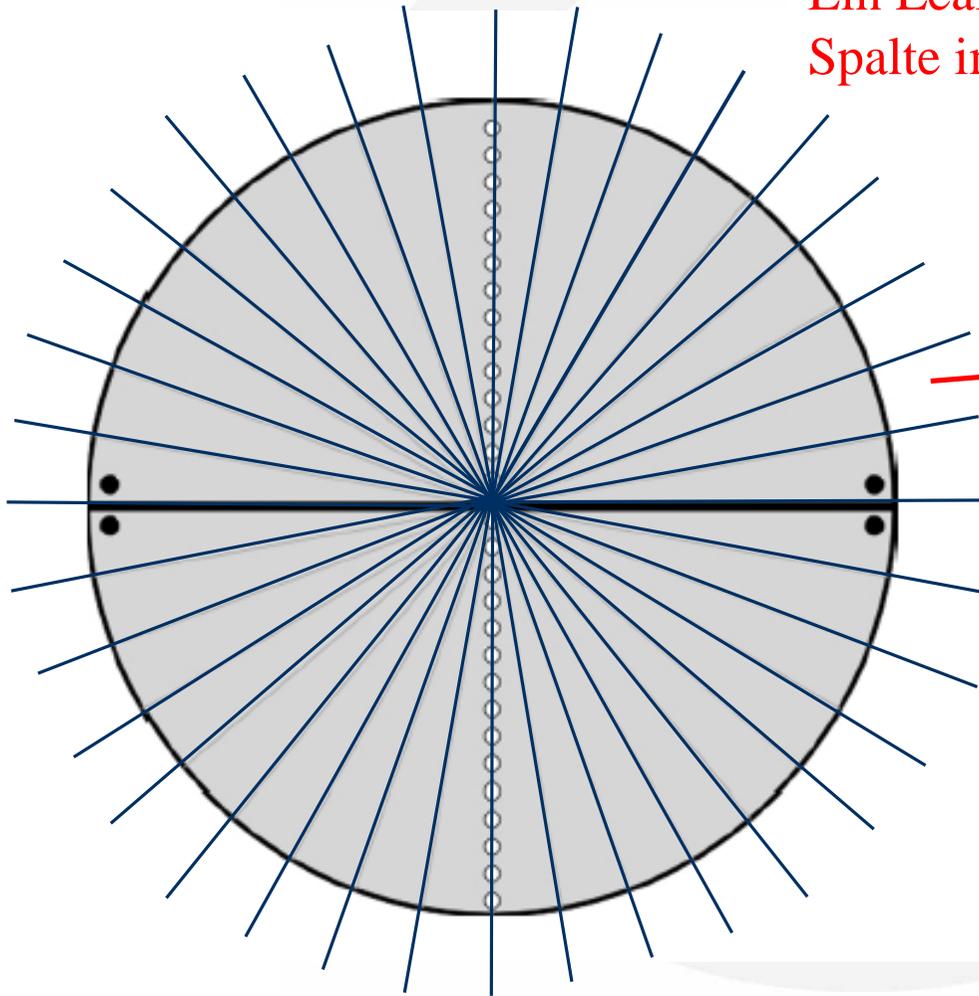
Phantomplan mit einem lateralen ZV und zentralem Risikoorgan



Aufteilung der Rotation in Projektionen (für Patientenbestrahlungen 51 Projektionen)



Ein Leaf entspricht einer Spalte im Sinogramm

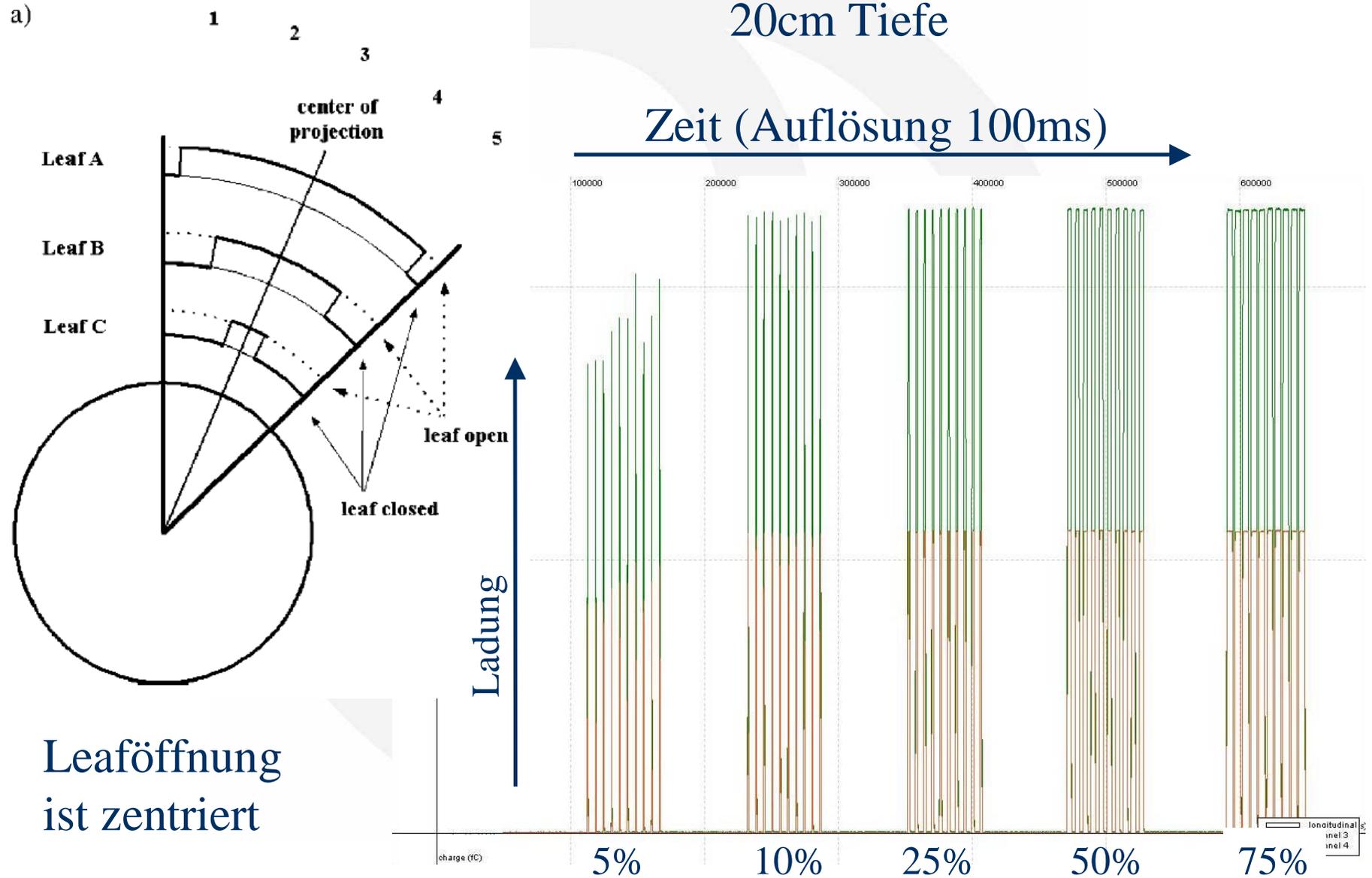


Eine Projektion entspricht einer Zeile im Sinogramm



Leaföffnungszeiten

Messung in 10cm und 20cm Tiefe



Leaföffnung
ist zentriert



Auswertung

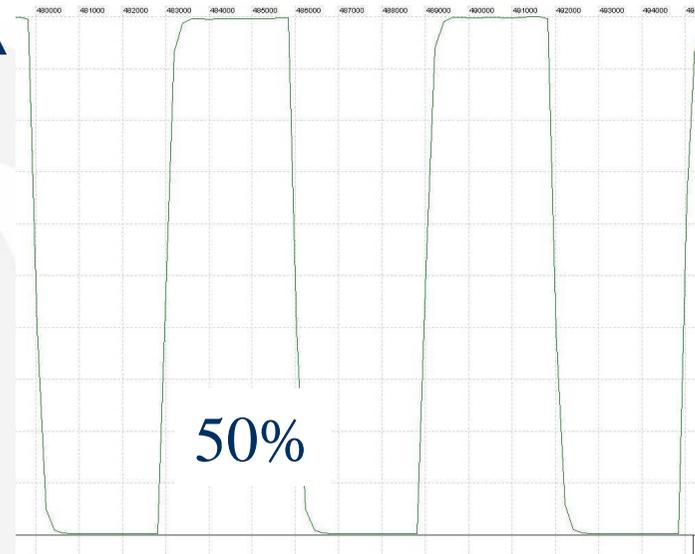
Zeit

Länge der Signale

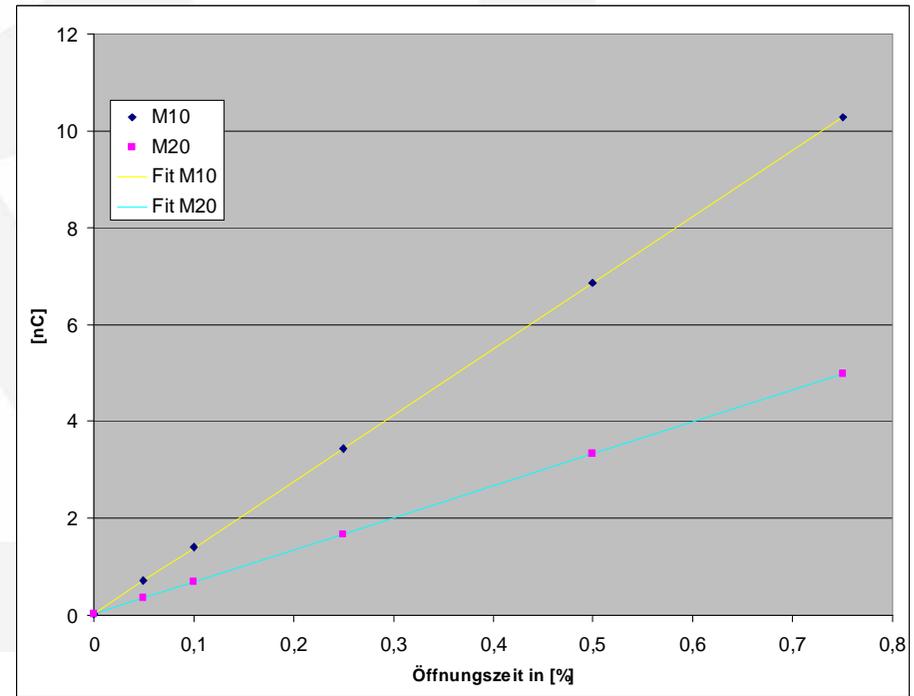
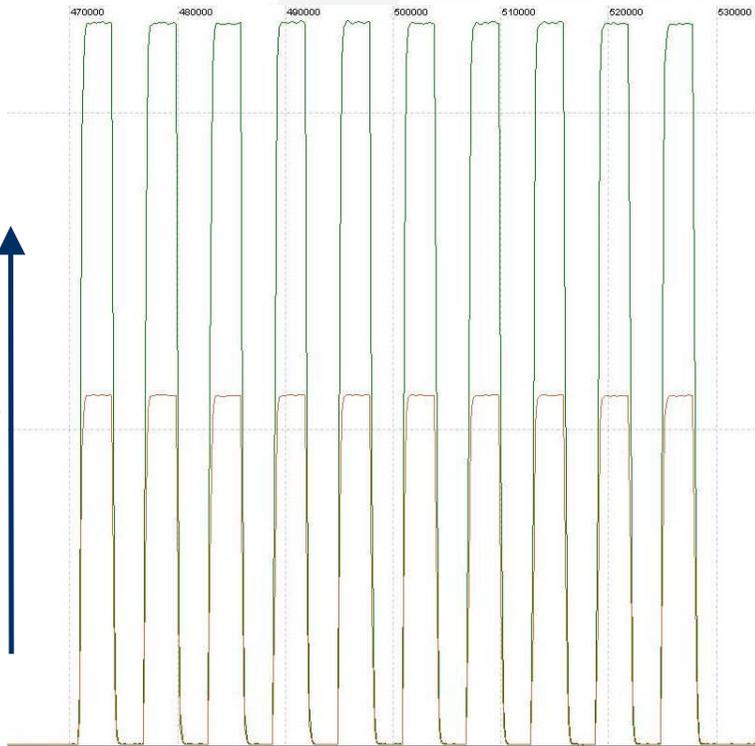
Ladung

Dosis durch Integration

Zeit



Ladung





Dynamische QA

5 Rotationen

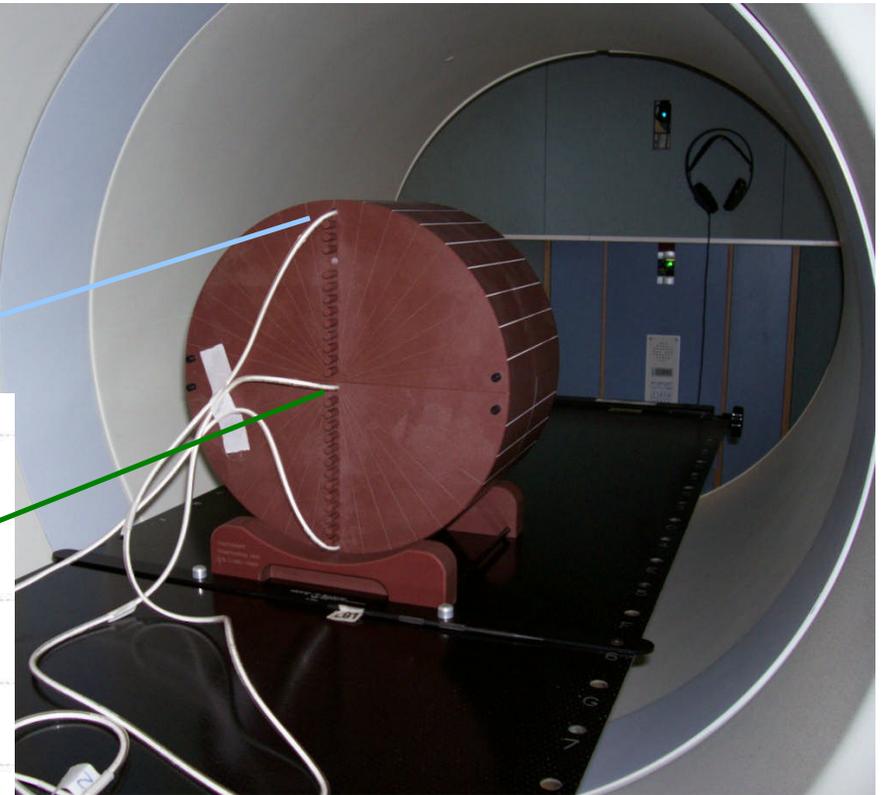
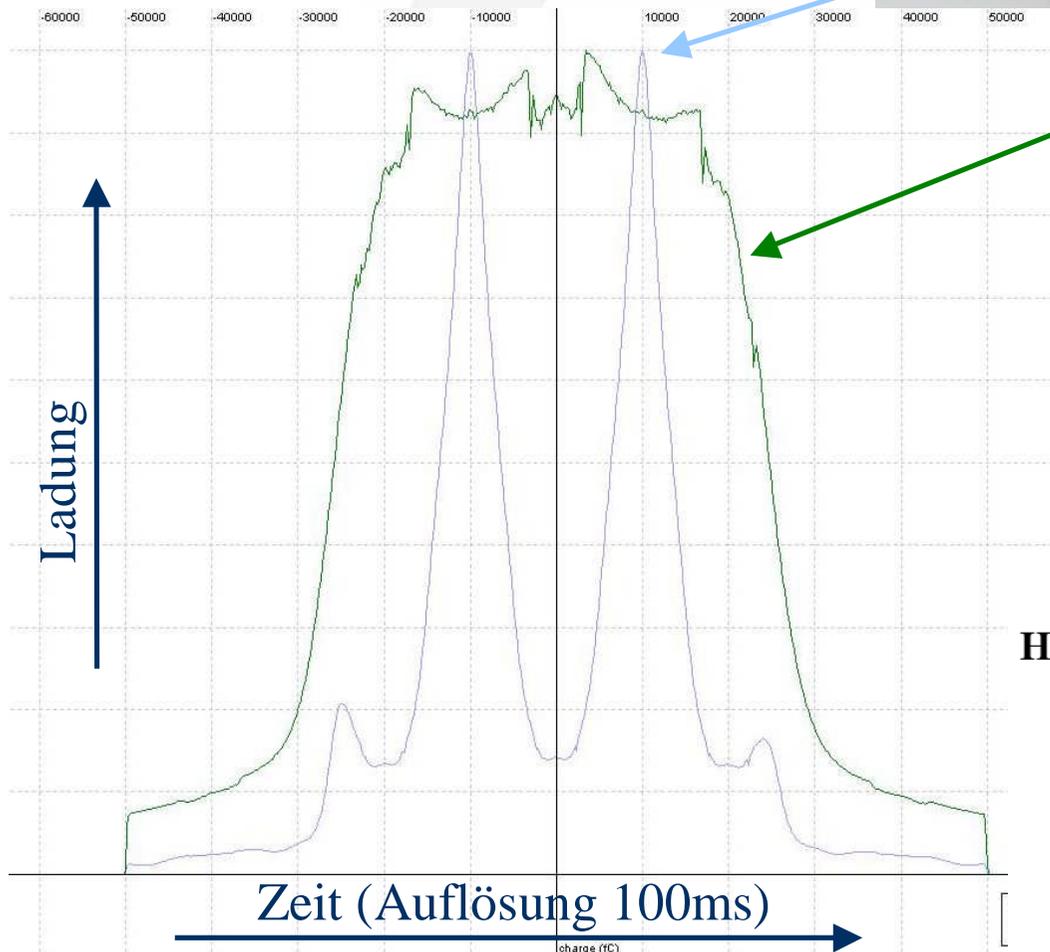
10cm Tischvorschub

1mm/s Tischgeschwindigkeit

Rotationszeit 20s

Feldlänge 5cm

Dauer 100s



Helical TomoTherapy Dynamic Quality Assurance

John Balog

Mohawk Valley Medical Physics, 127 Dixon Drive, Rome, NY 13440

Tim Holmes

St. Agnes HealthCare, 900 Canton avenue, Baltimore, MD 21229-5299

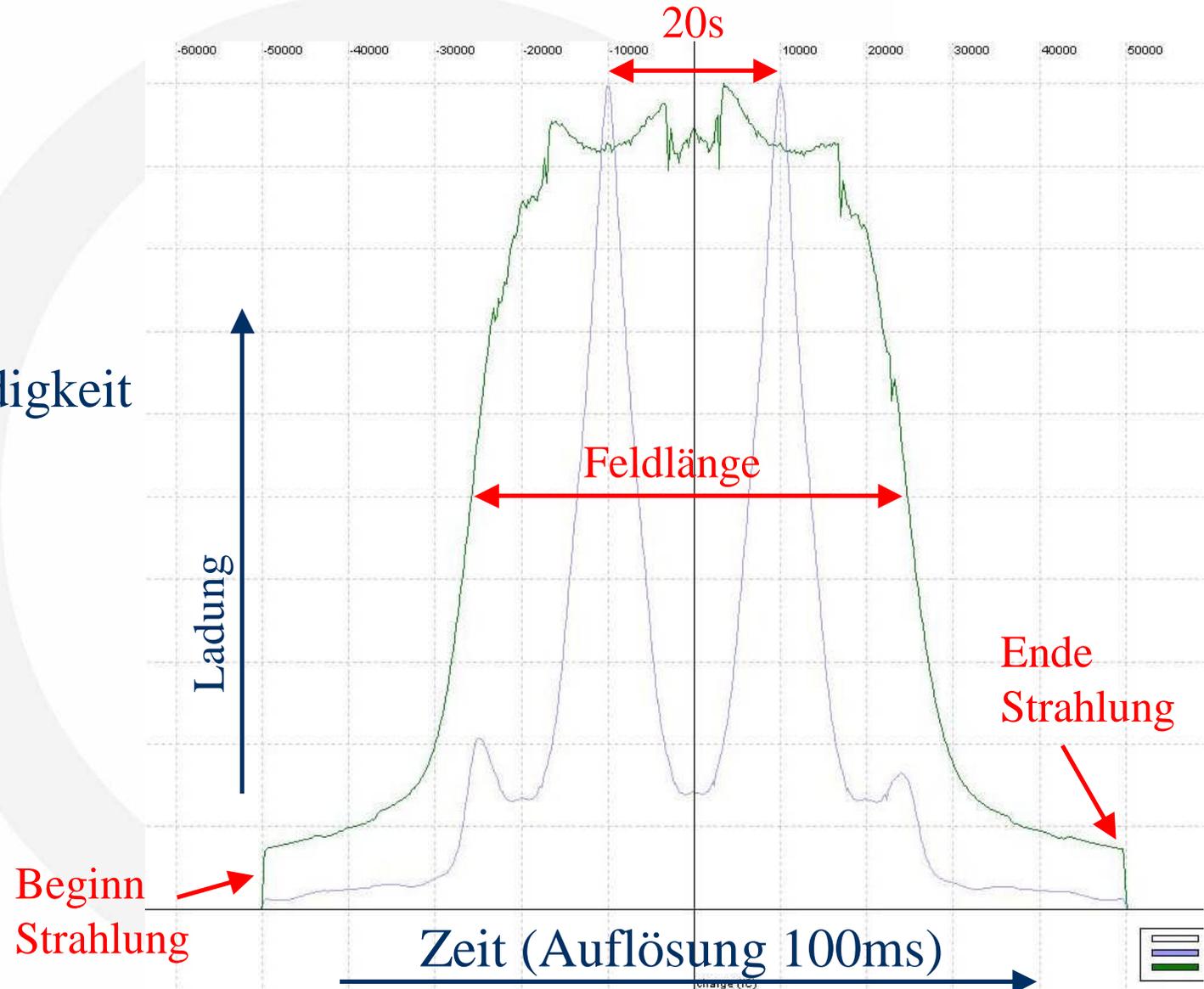
Richard Vaden

E.C. Rost Oncology LLC, Tallahassee, Fl



Rotationszeit
20 Sekunden

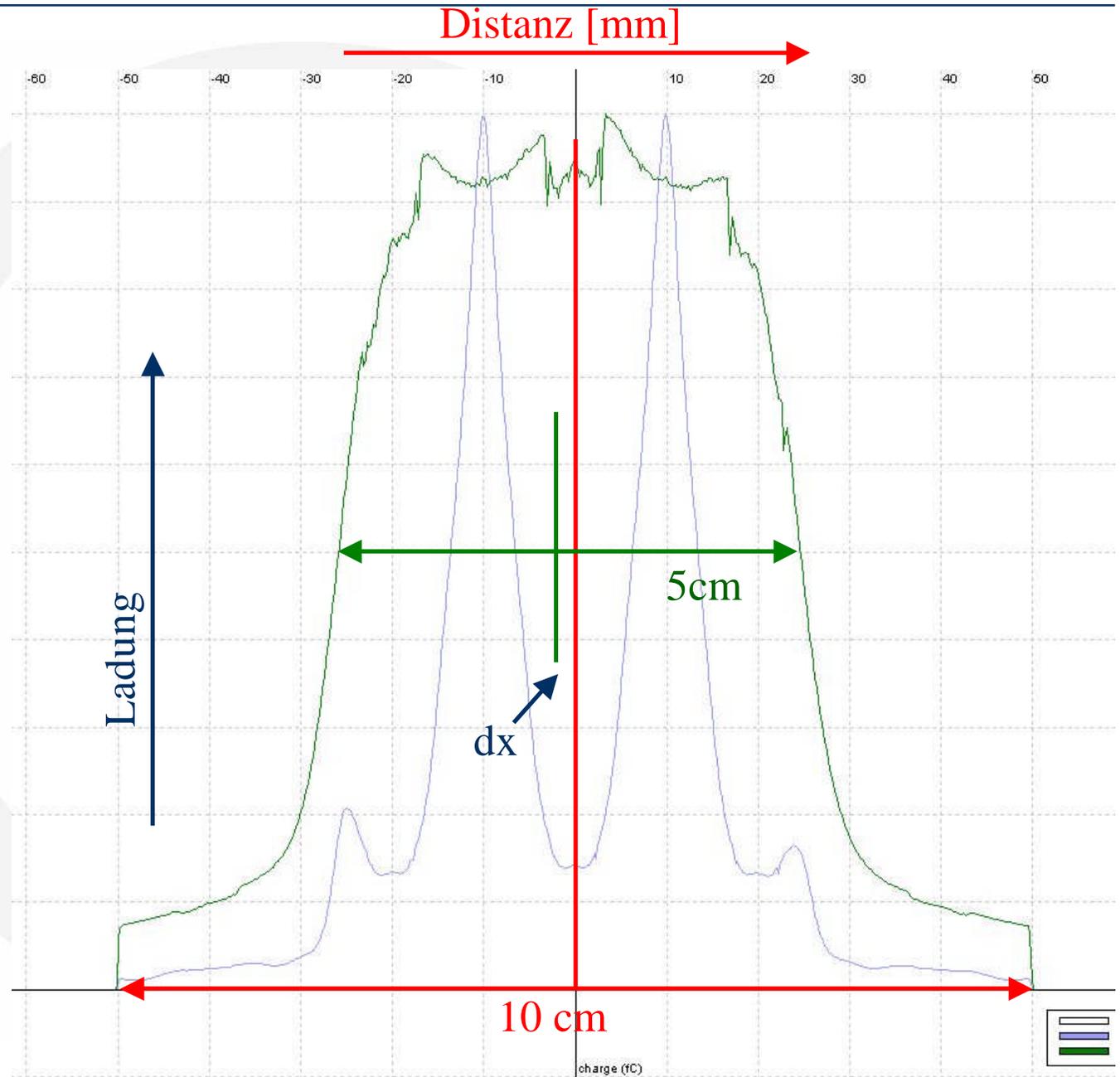
Tischgeschwindigkeit
über Feldlänge

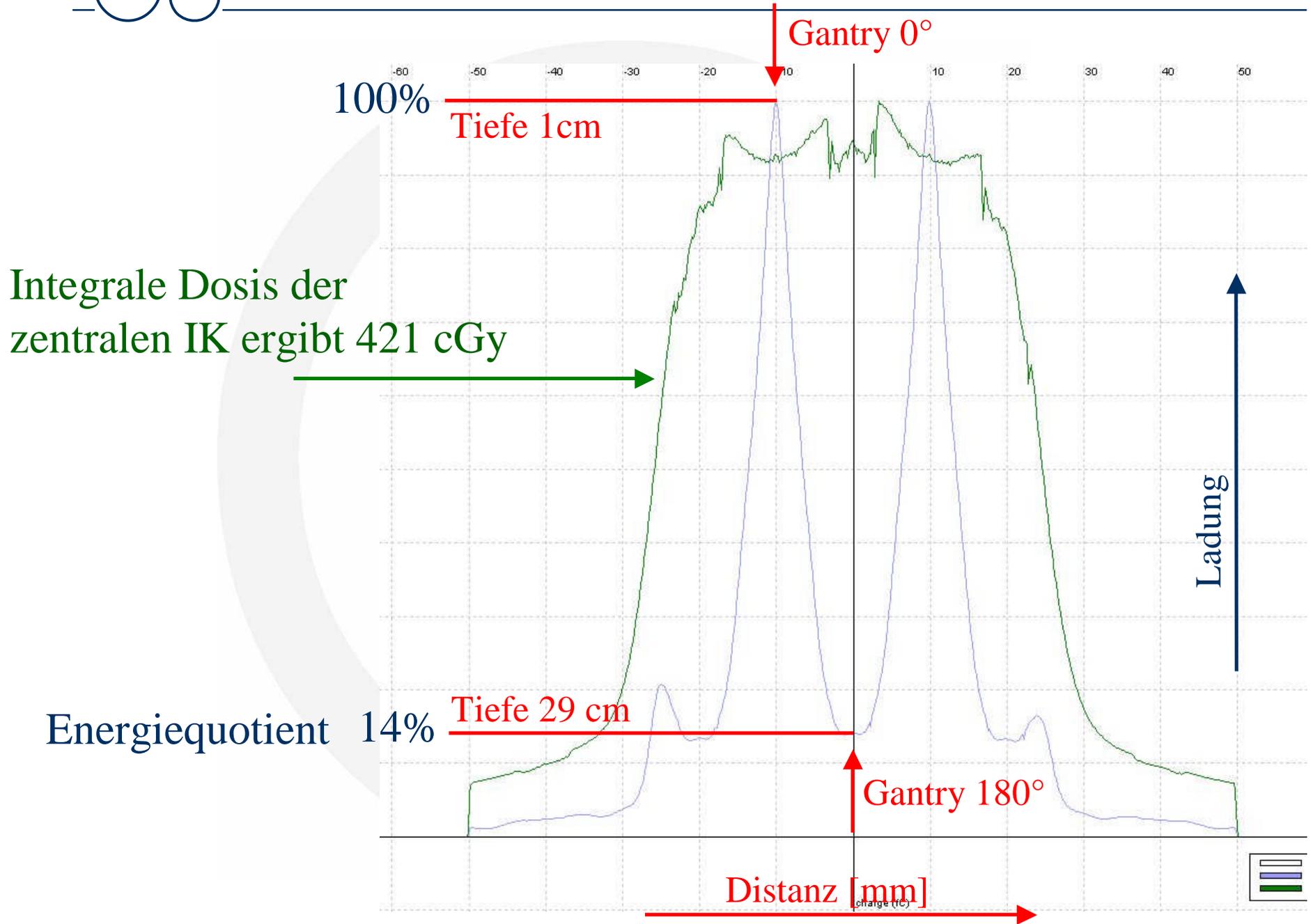




Tischposition
zu Beginn

long. Laser



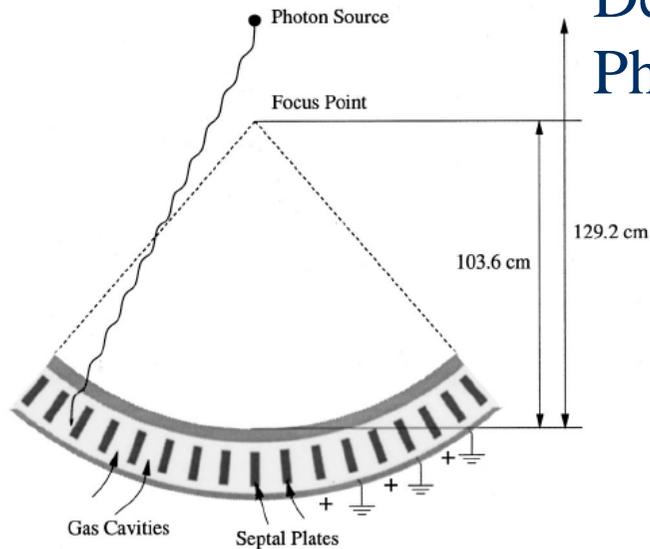




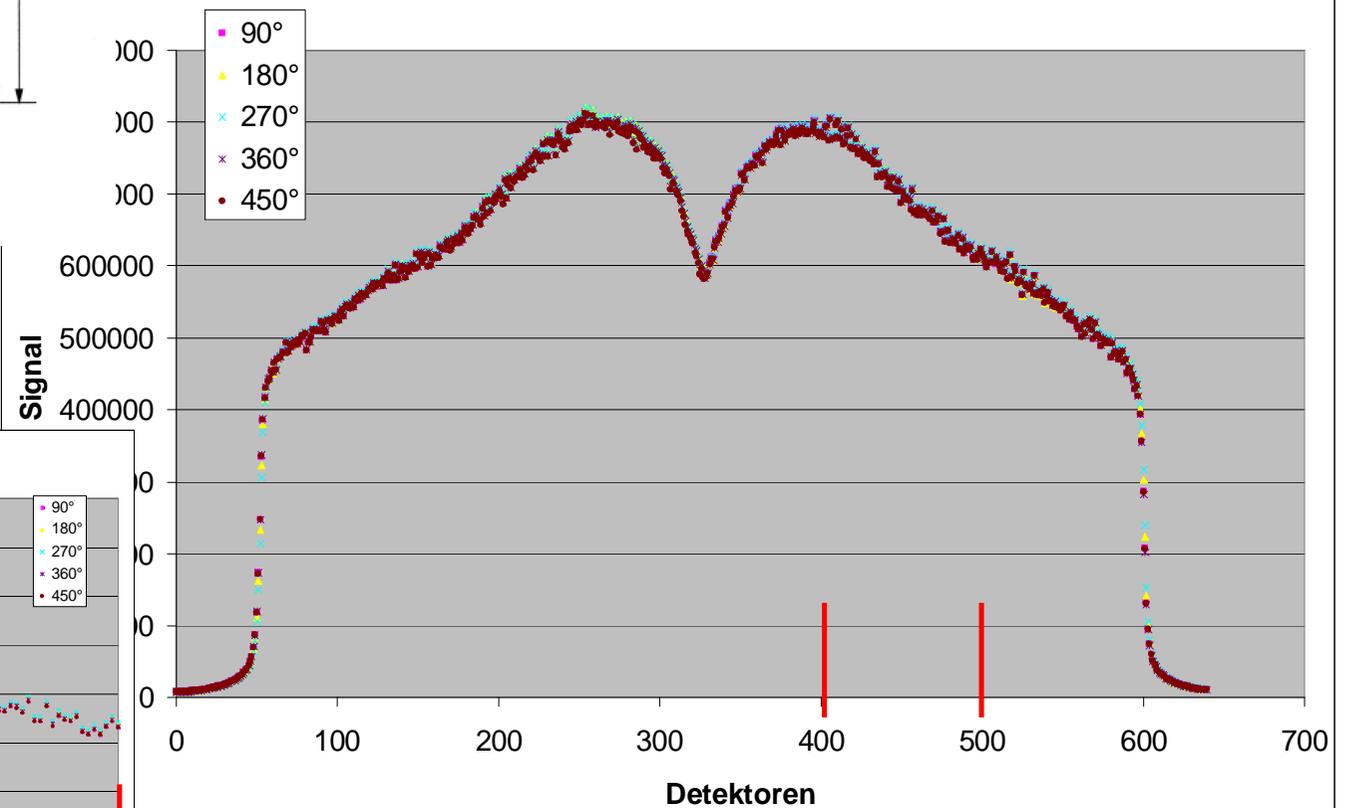
Laterale Dosisverteilung mit CT-Array

Detektorarray ist nicht auf
Photonenquelle fokussiert

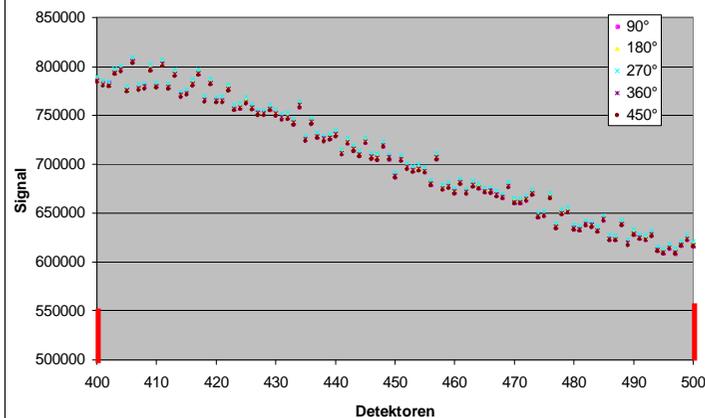
Messung ohne Phantom und Tisch



Abhängigkeit Dosisverteilung von Gantrywinkel



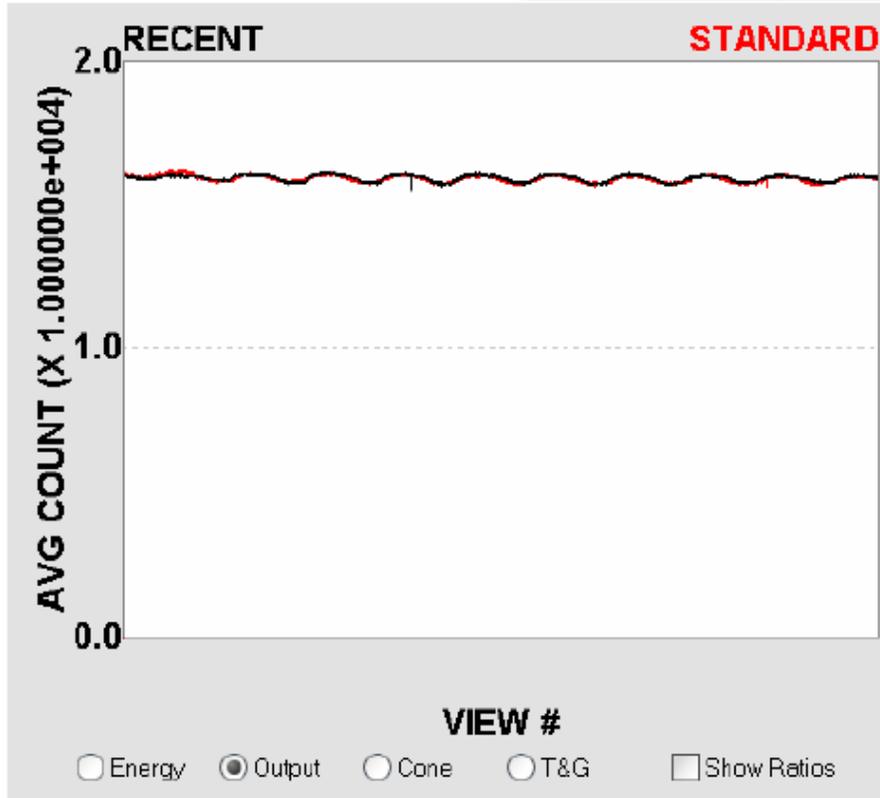
Abhängigkeit Dosisverteilung von Gantrywinkel



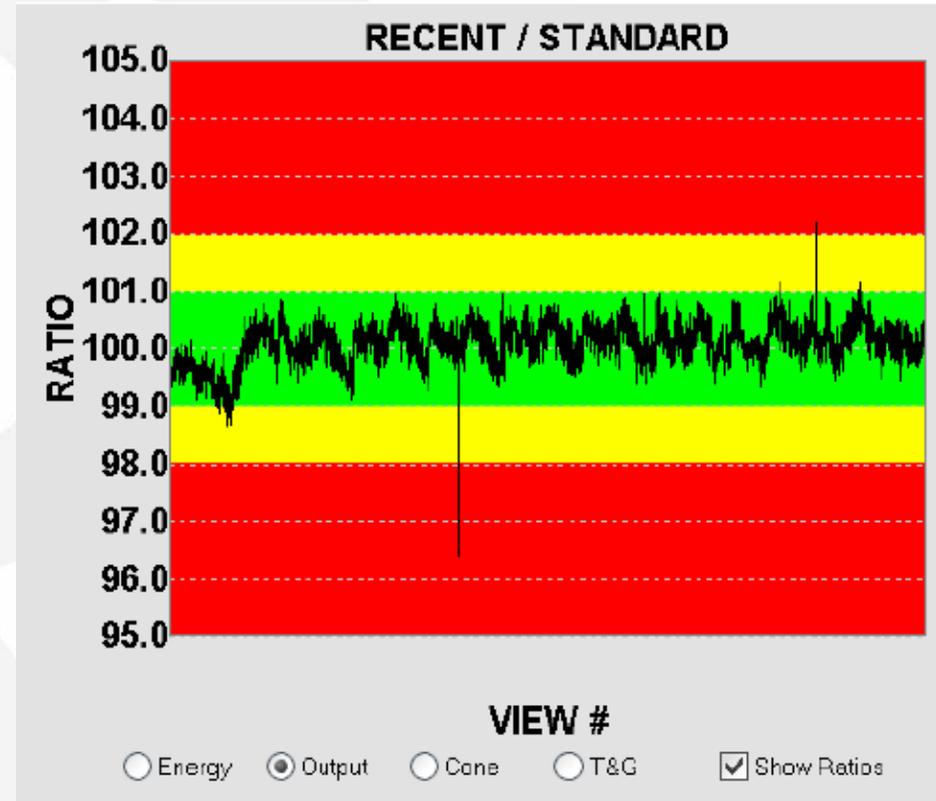


Dosis mit Monitorkammer

Signal der Monitorkammer
bei Rotation



Abweichungen



Darf man Messwerte der Maschine zur QA verwenden ?

