



EPIgray[®]

Automatische Bestrahlungs-QA
mittels EPID



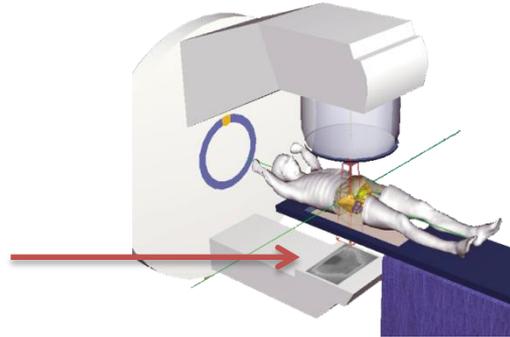
EPIgray[®], *in vivo* Dosis Überwachung

In vivo dosimetry ist die direkteste Methode zur Überwachung der bestrahlten Dosis, die den Patient während der Strahlentherapie erreicht.

AAPM, Report No. 87, 2005

EPID System

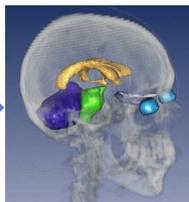
- Bereits integriert in den LINAC
- Wird für transit dosimetry benutzt



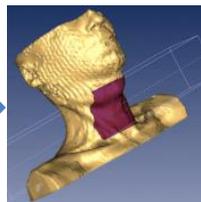
EPIgray[®], *in vivo* Dosis Überwachung



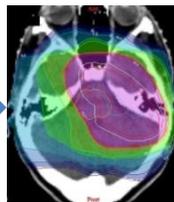
Patienten
Anatomie Daten
Übernahme



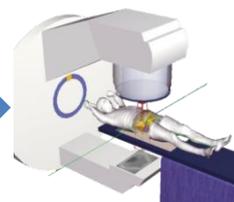
Volumen
Darstellung



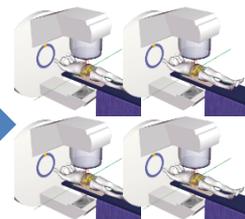
Festlegung
Bestrahlungsparameter



Dosis Berechnung
Verifikation der
Bedingungen

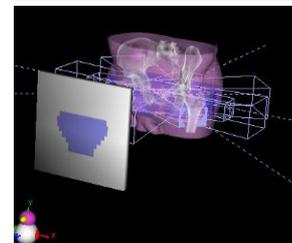


Bestrahlung
Erste Fraktion



Bestrahlung
Alle Fraktionen

In vivo
Dosimetrie
EPIgray



EPIgray[®], das einzigartige Fehlererkennungssystem

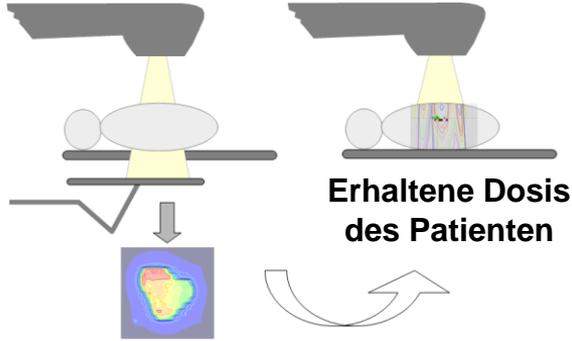
**In situ Dosis
Rekonstruktion**



Feststellung



Nachprüfung



**Portal Image
Transit dose
durch den Patienten**

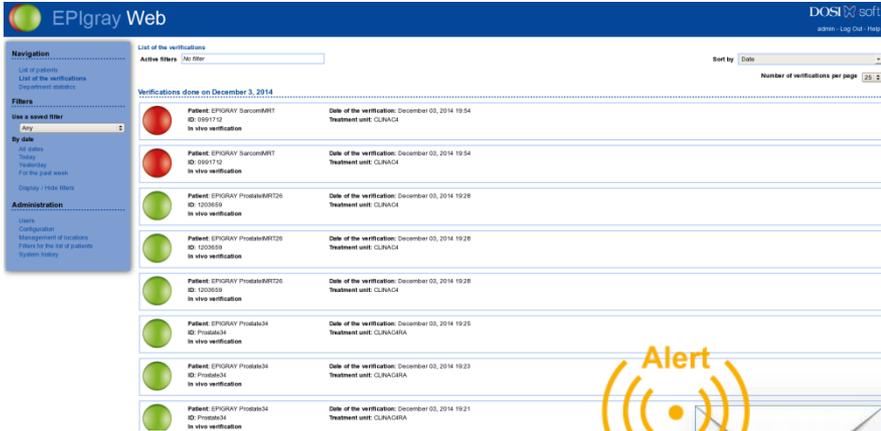


EPIgray[®] erfüllt Ihre Anforderungen

- **Alternative** zur Standard *in vivo* Dosimetrie
- **Schneller** Algorithmus für den *in vivo* Überprüfungsstatus
- **Geringer Bedarf** von dosimetrischen Daten notwendig für Dosisformalismus und EPID
Erwiderungs-Modellierung
- Gewährleistet eine **Genauigkeit** der rekonstruierten Dosiswerte gleichartig mit
gemeinsamen Aktionsebenen für Fehlererkennung
- Stellt ein **einfaches** und **effizientes** Warnungs- / Benachrichtigungs System bereit
- Stichhaltige Alternative zu einigen Vorbestrahlungssystemen



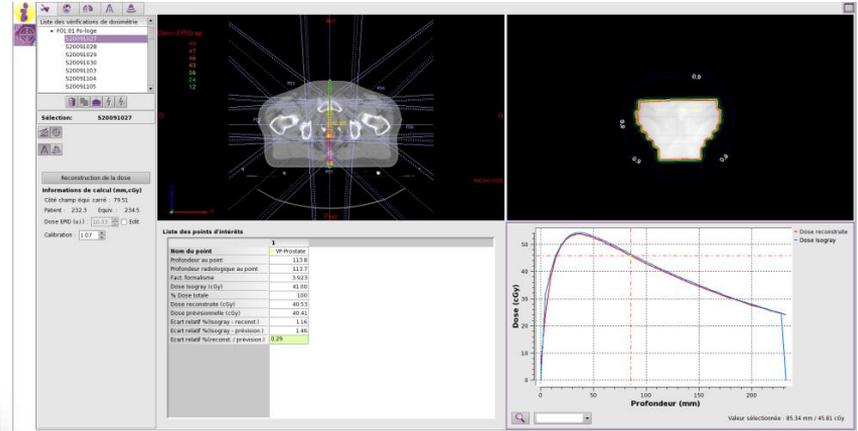
1 Lösung - 2 integrierte Module



The screenshot shows the EPIgray Web interface. The top navigation bar includes the EPIgray logo and the DOSI soft logo. The main content area displays a table of verifications for December 3, 2014. The table has columns for Patient ID, Date of verification, and Treatment unit. An 'Alert' icon (a yellow envelope with radiating lines) is overlaid on the bottom right of the table.

Patient	Date of the verification	Treatment unit
EPiGRAY SarcomART ID: 100712 In vivo verification	December 03, 2014 19:54	CLINACA
EPiGRAY SarcomART ID: 100712 In vivo verification	December 03, 2014 19:54	CLINACA
EPiGRAY ProstateART26 ID: 100355 In vivo verification	December 03, 2014 19:28	CLINACA
EPiGRAY ProstateART26 ID: 100355 In vivo verification	December 03, 2014 19:28	CLINACA
EPiGRAY ProstateART26 ID: 100355 In vivo verification	December 03, 2014 19:28	CLINACA
EPiGRAY Prostate34 ID: Prostate34 In vivo verification	December 03, 2014 19:25	CLINACA
EPiGRAY Prostate34 ID: Prostate34 In vivo verification	December 03, 2014 19:23	CLINACA
EPiGRAY Prostate34 ID: Prostate34 In vivo verification	December 03, 2014 19:21	CLINACA

Web-basierte Module
(Zugriff von jedem Computer)



The screenshot shows the EPIgray workstation interface. The top part displays a CT scan of a patient's pelvis with a yellow region of interest. Below the scan, there is a table of 'Liste des points d'intérêt' (List of points of interest) with columns for Name, Point, and Value. A graph on the right shows the dose distribution (Dose in Gy) versus depth (Profondeur in mm). The graph has two curves: a solid blue line for 'Dose recalculée' (Recalculated dose) and a dashed red line for 'Dose logray' (Logray dose). The x-axis ranges from 0 to 200 mm, and the y-axis ranges from 0 to 50 Gy. The recalculated dose curve shows a peak of approximately 50 Gy at a depth of about 50 mm, while the Logray dose curve is a constant horizontal line at approximately 45 Gy.

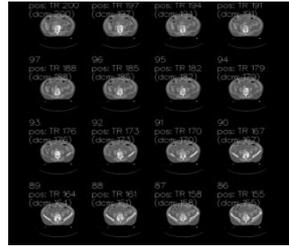
Nom de point	Point	Valeur
Profondeur au point		113.6
Profondeur radiologique au point		113.7
Pitch normalisé		1.923
Dose logray (cGy)		41.89
% Dose totale		100
Dose recalculée (cGy)		40.53
Dose prescrite (cGy)		40.4
Ecart relatif (logray - prescrite)		1.16
Ecart relatif (logray - prescrite)		1.46

Experten Modul
(EPIgray® workstation)

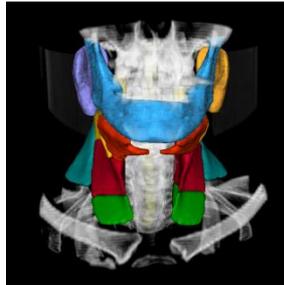


Nur 2 Schritte

CT Bilder

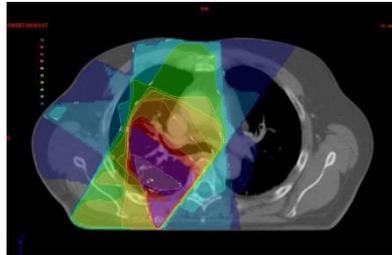


RTPlan

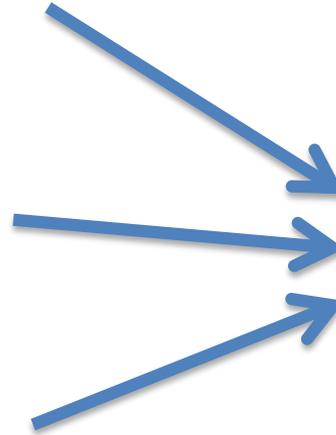


RTStruct

RTDose



Point Of Interest



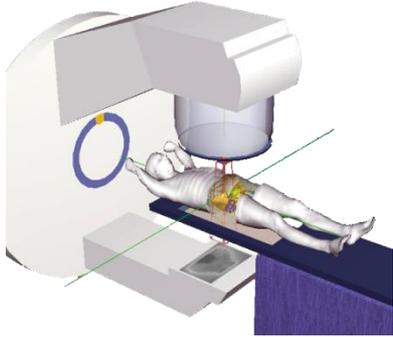
Schritt 1
Export von
Patientendaten

EPIgray®

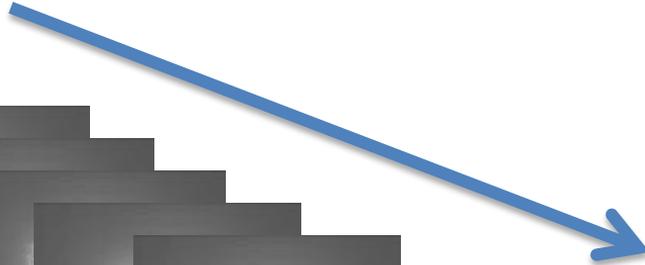
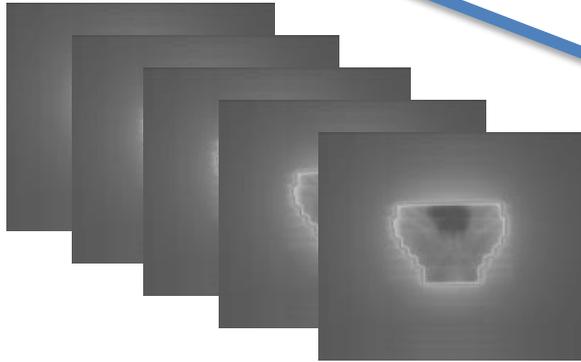


Nur 2 Schritte

Schritt 2
Export/Import EPID Bilder



EPIgray®



Nur 2 Schritte

Das ist Alles !
Dosis Rekonstruktion
und automatische
Analyse

EPIgray Web DOSI soft
admin - Log Out - Help

Navigation
List of patients
Department statistics

Filters
Use a saved filter
Any
By status
 Consistent
 Authorized
 To be checked
All
 Not consistent
 Closed, Not closed
All status
By date
All dates
Today
Yesterday
For the past week
Display / Hide filters
Administration
Users
Configuration
Management of locations
Filters for the list of patients
System history

List of patients
Active filters: No filter
Search:

ID	Last name	First name	Date of birth	Plan	Stage	Last Vert.	Last update	Status of the plan
0991712	EPIGRAY	SarcomMRT	22 Apr 1961	PTV 50.4 Gy2	In Vivo Dose (2)		3 Dec 2014 19:54	Not consistent (VCI)
1203659	EPIGRAY	ProstateMRT26	5 Sep 1945	IMRT 26	In Vivo Dose (3)		3 Dec 2014 19:28	Consistent
Prostate34	EPIGRAY	Prostate34	1 Jan 1970	Prostate34 RA	In Vivo Dose (3)		3 Dec 2014 19:25	Consistent
0481077	EPIGRAY	PositioningEmor	4 Aug 1937	1 Hemt basin	In Vivo Dose (2)		3 Dec 2014 19:17	Not consistent (VCI)
1089429	EPIGRAY	MetaOrbite	29 Apr 1958	2 MetaOrbite 1	In Vivo Dose (2)		3 Dec 2014 18:23	Consistent
1302112	EPIGRAY	Encephale	14 Apr 1947	1 Encephale	In Vivo Dose (3)		3 Dec 2014 18:22	Consistent
20140374	T Patient06	Breast	25 Sep 1999	TG	In Vivo Dose (3)		3 Dec 2014 17:50	Consistent
20130653	TOURS	Patent56	26 Apr 1948	TG	In Vivo Dose (3)		3 Dec 2014 17:36	Consistent
20140940	T Patient08	Chest Wall	13 Feb 1952	TG	In Vivo Dose (3)		3 Dec 2014 16:29	Not consistent (VCI)
20140056	T Patient56	Encephale	5 Apr 1939	EIT	In Vivo Dose (3)		3 Dec 2014 16:27	Consistent

10 Found

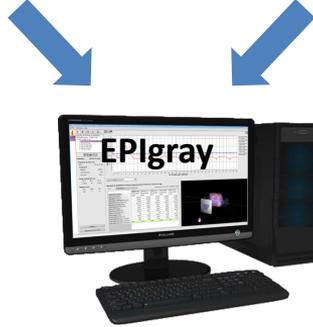
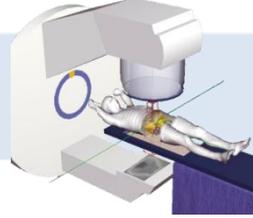


Nur 2 Schritte

TPS oder R&V



LINAC - Bestrahlung



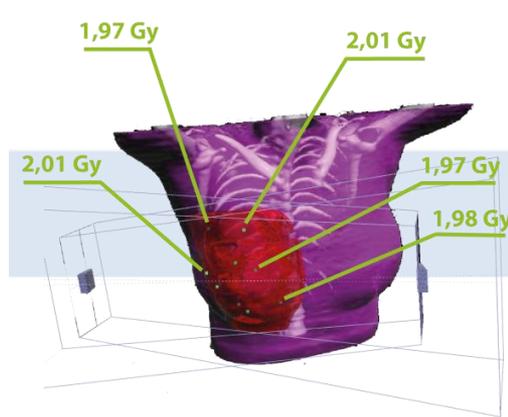
In vivo dose monitoring



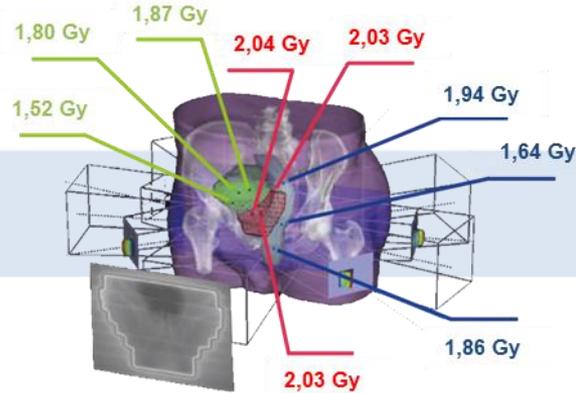
**Augenblickliche & Automatische
Alarmmeldungen
Sicherer & Echtzeit Fernzugriff**



Dose-to-PTV Augenblickliche Beurteilung !



Automatische Erstellung von relevanten PTV Kontrollpunkten und statistischen Fehlererkennung



Automatische Fehlererkennung basiert auf Anwender definierten Interessenpunkten (POI)



Resultate auf jedem Display von jedem web browser



Augenblickliche & automatische Fehlererkennung

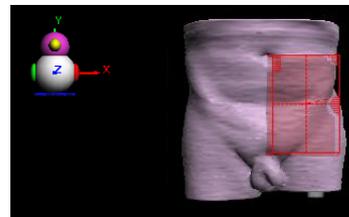


EPIgray[®], das einzigartige Fehlererkennungs-System

Fall: 8cm Verschiebung notwendig für Patienten Positionierung

Fehlererkennung: vergessene Verschiebung während der zweiten Fraktion

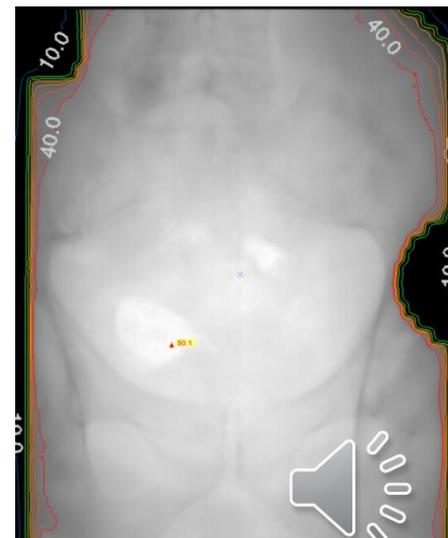
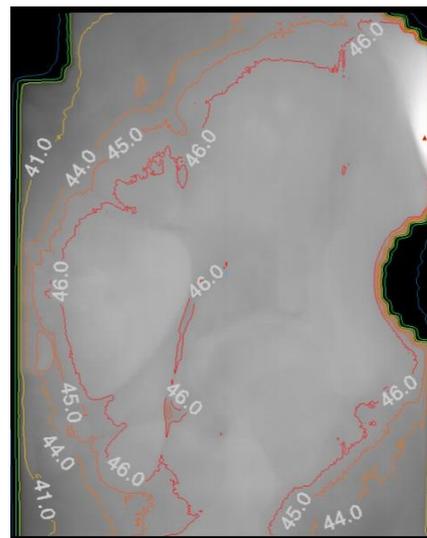
Wo: direkt sichtbar auf dem EPID Bild



	Fraction No.1	Fraction No.2
Date	28 Mar 2012	29 Mar 2012
Time	13:33	14:45
Point Depth (mm)	89.2	89.2
Point radiological depth (mm)	94.75	94.75
Source-image distance (mm)	1500	1500
Equivalent square field size (mm)	186.08	186.08
Formalism factor	3.661	3.661
Used EPID image value (i.u.)	41.17	43.73
Reconstructed dose (cGy)	150.71	160.1
Predicted dose (cGy)	150	150
Relative deviation % (reconst. / predicted)	0.47	6.73

Erste Fraktion

Zweite Fraktion



Fall: Becken - Verschiebungsfehler

Keine zusätzliche Arbeitsbelastung

Schneller Aufbau: Nur ein Tag

- Installation
- Integration in das lokale Netzwerk
- Training

Bibliothek modelliert durch DOSIsoft

- Golden Data
- oder Messungen an Ihrem LINAC: **2 Stunden pro Energie**



Ihre Vorteile auf einen Blick

- Automatische Alarmmeldungen für Dosis Abweichungen
- Sicherer Fern- & Echtzeit Zugriff
- Erhöhte Effizienz in der Abteilung
- Anatomisch basierte *in vivo* Messungen
- Komplette Rückführbarkeit



Abfrage der Resultate Jederzeit und Allerorts!





Vielen Dank für Ihre
Aufmerksamkeit !



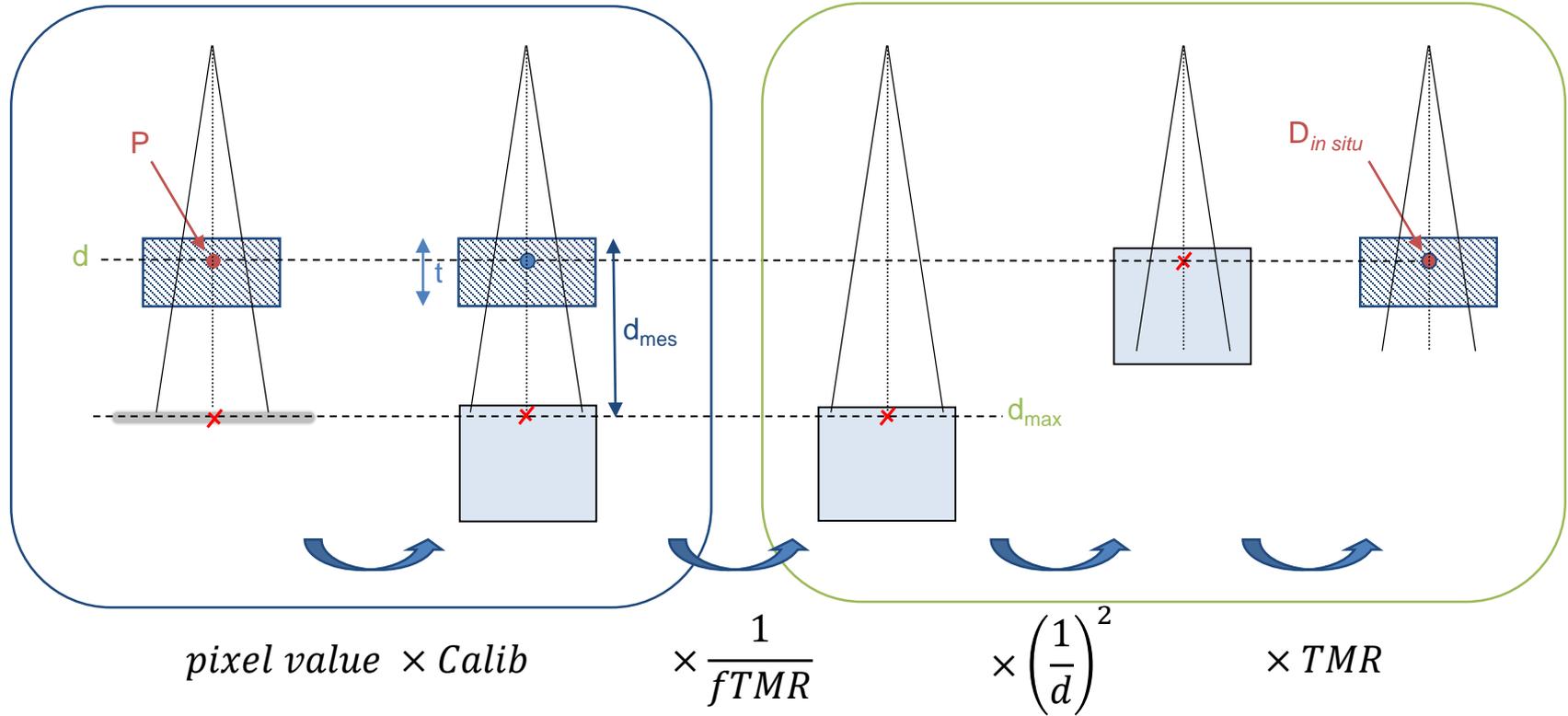


Appendices

Formalism

Required measurements

EPIgray[®] Formalism



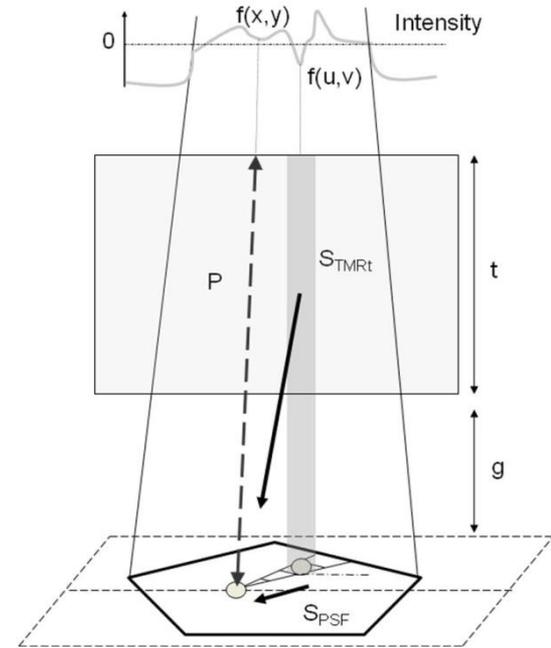
Back projection based on “Finite TMR” method



EPIgray[®] Formalism

Clarkson Double Decomposition

Dose = Primary + Scattered



Required Measurements

EPIgray[®]

Correction of the EPID response

- Calibration coefficient: one image to be acquired and one measurement with an ionization chamber at the same SDD.
- Water / aSi conversion factors (EPID measurements for several phantom thicknesses and field sizes).

Reconstruction in the patient

- Quality index of the beam ($TPR_{20,10}$) for the open field + non dynamic wedge filters (*TPS*)
- Depth dose curves (*TPS*)
- Finite TMR modeling (dose measurements with an attenuator of variable thickness, in a solid phantom or water tank at 3 different SDD, for at least 5 field sizes and 6 patient thicknesses)
- Dose profile for the largest possible field size measured in a semi-infinite homogeneous phantom, for open field and non-dynamic filters.

