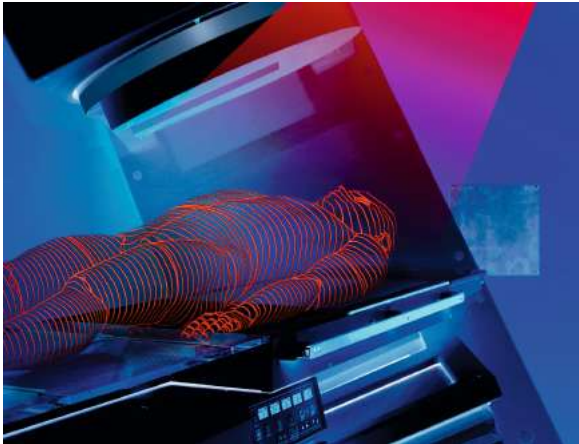




Laser Systems for Patient Alignment



GALAXY

Patient

TOPOGRAPHY

Laser System

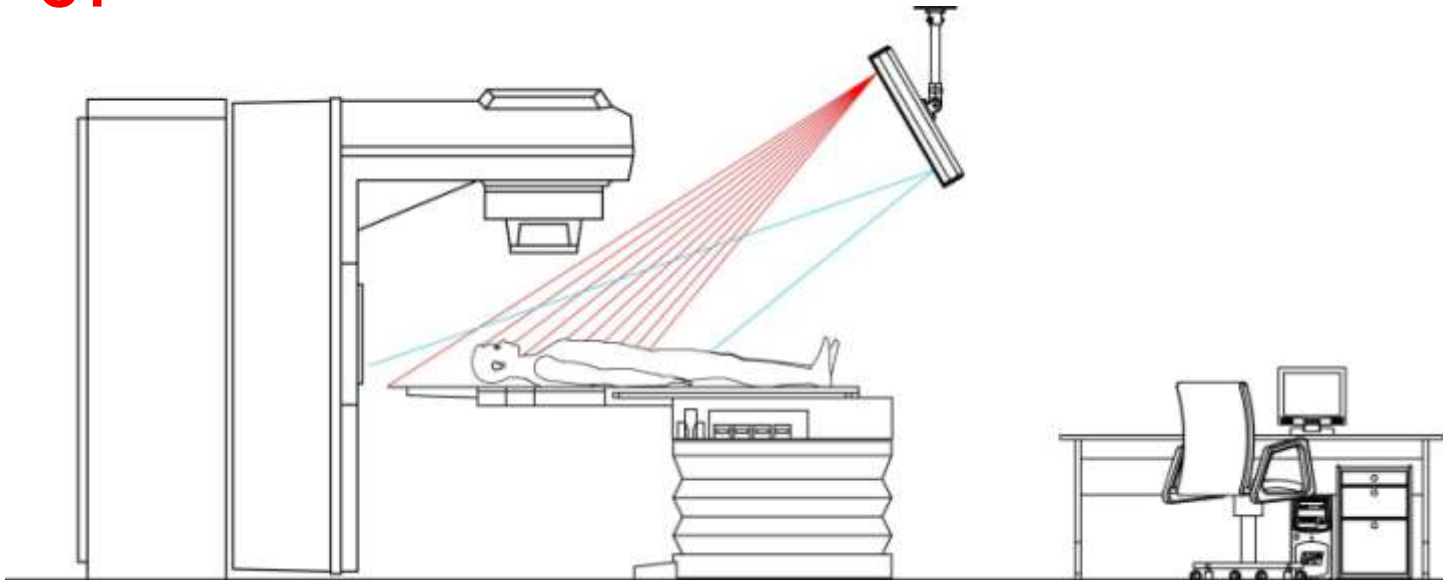


The GALAXY System

NEW METHOD FOR HIGHER ALIGNMENT ACCURACY.

Patient Positioning System for

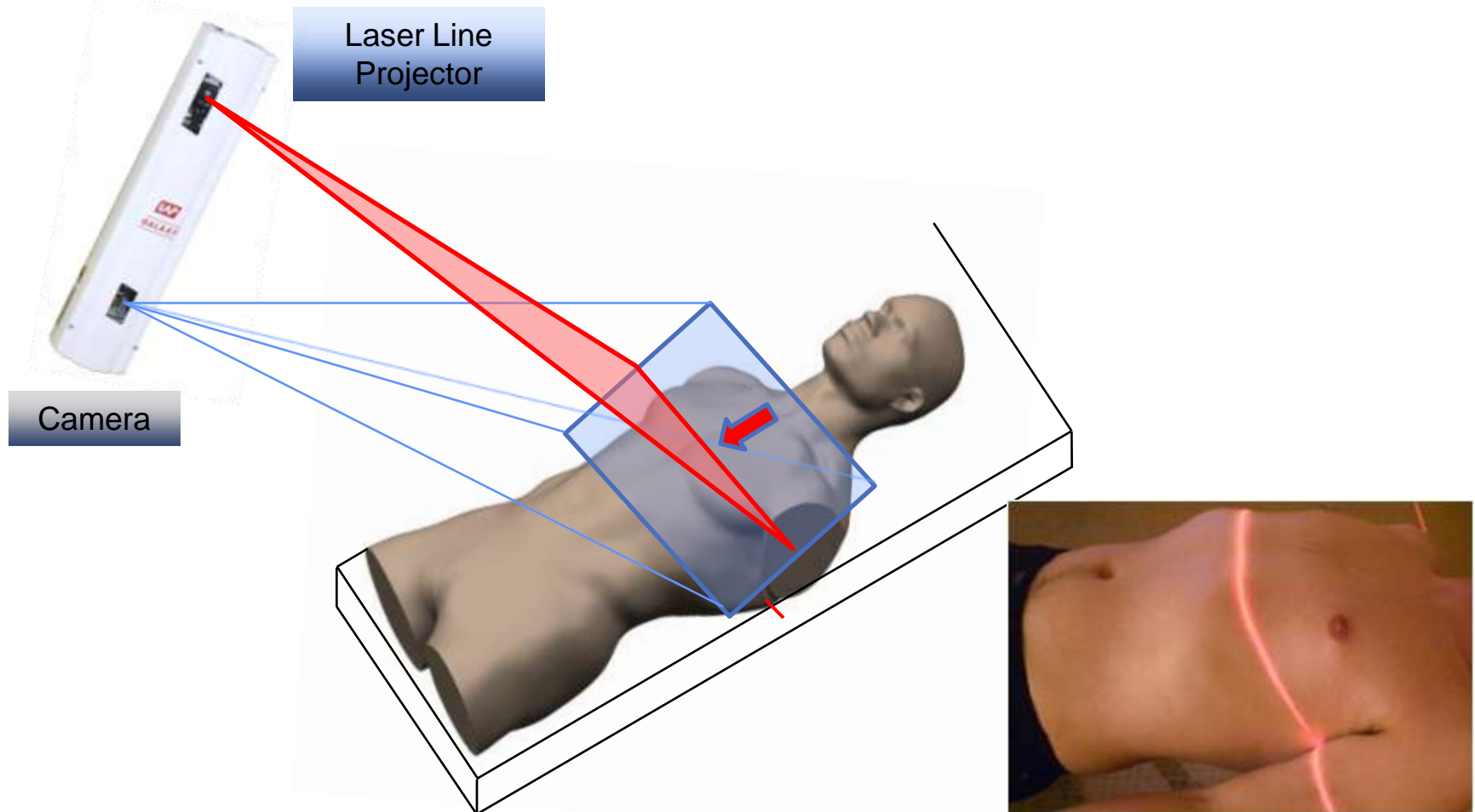
- **Linac**
- **Simulator**
- **CT**



- **3D Patient Surface Scanning System**
- **Automatically calculates patient shift vectors**
- **Interface to the couch for a semi automatic patient setup**
- **DICOM 3 Interface**
- **Network shared database**



GALAXY - The Working Principle



GALAXY - The Working Principle



**Scanning
the Surface**





GALAXY

Workflow mit dem GALAXY System

Phase 1: Erstellen der Referenzdaten

Phase 2: Der tägliche Einsatz des GALAXY Systems im Beschleunigerraum



GALAXY Glx: Positioning

aw_19390530_001 -- Albert Wendisch

Creates new reference Reference: 16.07.2008 16:45:43

Setup

Treatment

Done

Scan

Calculated correction

Couch

	Absolute	Relative
Lat	5 mm	5,0 mm
Long	4 mm	4,0 mm
Vert	5 mm	4,9 mm
Rot	0 °	0,0 °

Posture

	Relative
Roll	0,0 °
Pitch	0,0 °

Quality

Overlap: 92 % Similarity 100 %

Quantified Result of
Scan and Matching

Presentation
of the
shiftvector in
6 DoF

Intuitive display
of calculated
patient shift

Ready Lat=0 Long=0 Vert=0 Rot=0

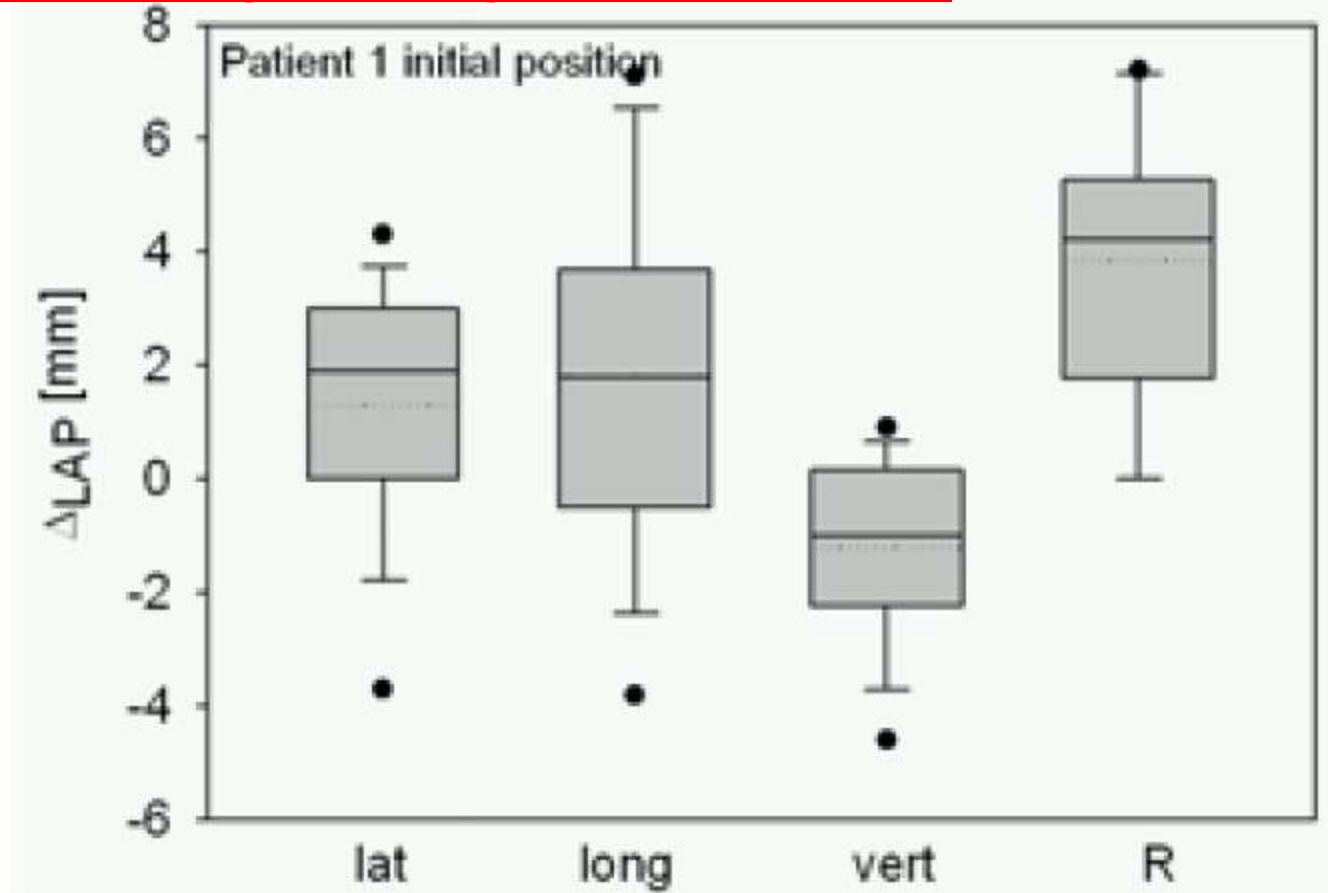


GALAXY- The Hardware



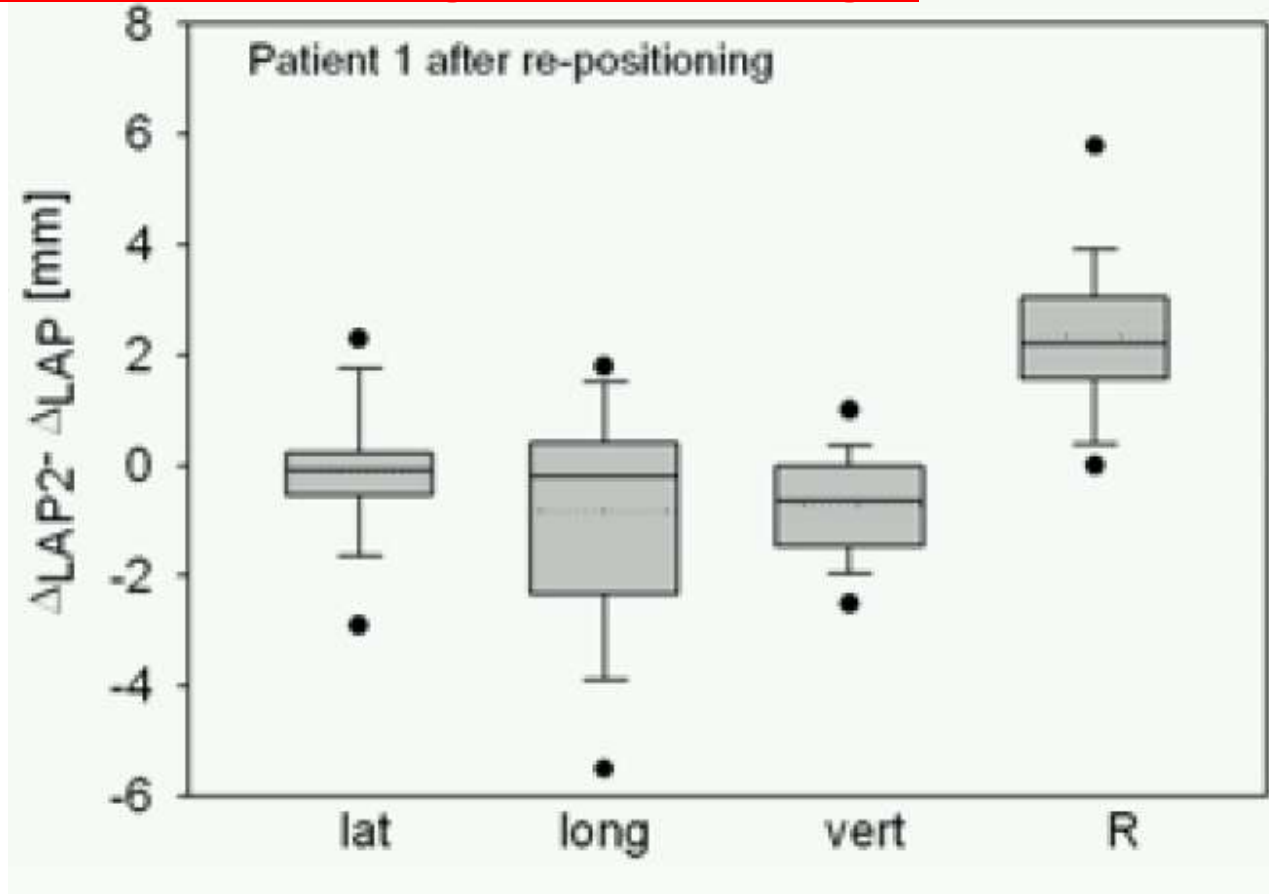
GALAXY – MAMMA CASE Heidelberg

After positionig according to the room lasers:



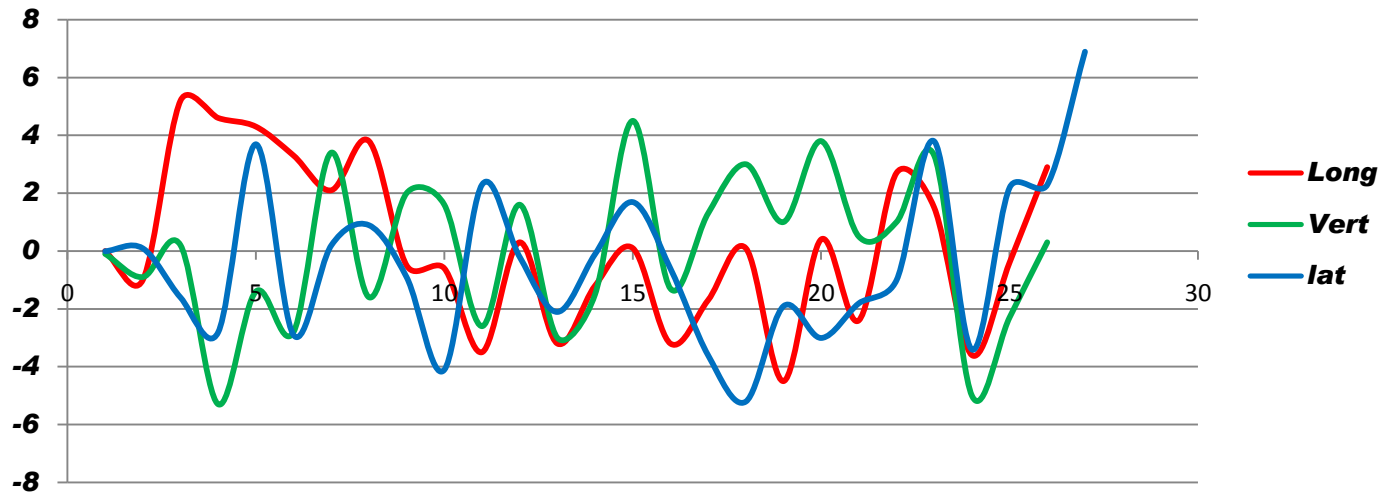
Source: Torsten Moser DKFZ Heidelberg 2008

Deviation after matching with the CT Images



Source: Torsten Moser DKFZ Heidelberg 2008

Daily shift



- 26 fractions scanned
- Reference image scanned at first table setup
- Data collected at Süd Harz Hospital Nordhausen

NEW:

Motion Monitoring during Treatment

Workflow:

- Reference Scan
Acquire the patients surface as a reference

- Breathing detection
Scan the patients surface over several breathing cycles

- Automated patient surveillance during the whole treatment session
An alarm alerts the personnel if the patient moves outside the tolerances.

GALAXY GlxMotion

aw_19390530_001 -- Albert Wendisch

Setup

Treatment

Done

Scan

Max deviation:

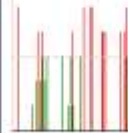
5 mm

Current deviation:

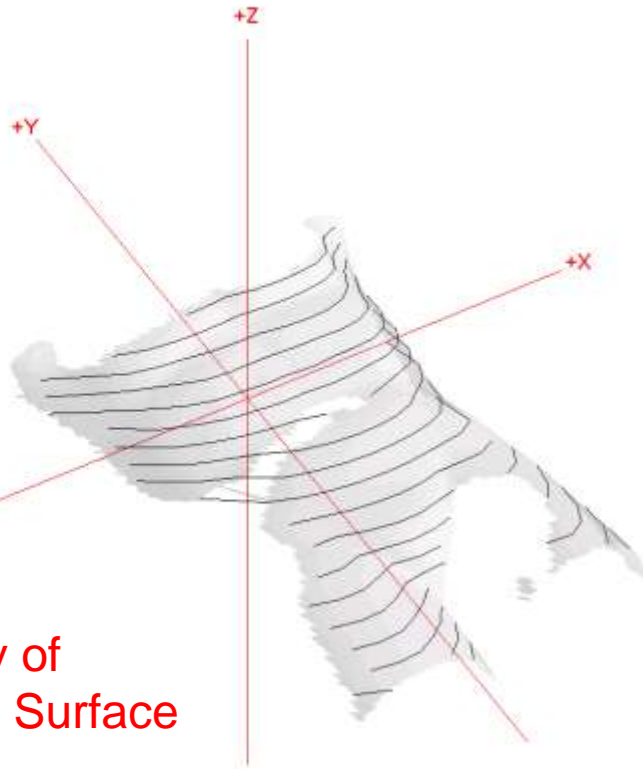
0 mm

Measurement
Results in
Realtime

Movement History
Chart



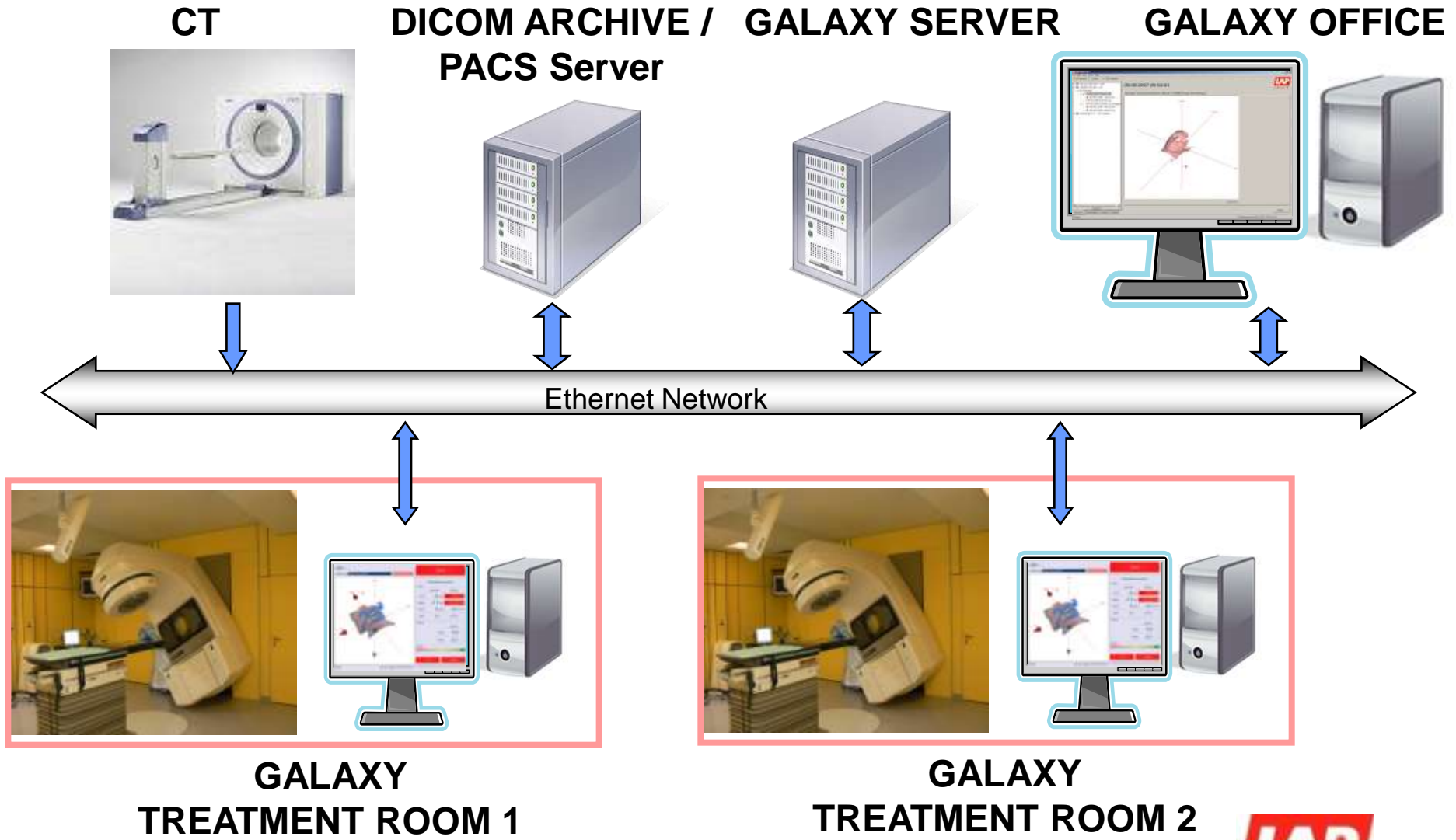
Display of
Patient Surface



Patient Movement Monitoring

- DICOM Import of Patient data
- Tolerance Settings adjustable
- Variable Breathing Detection Settings
- Flexible Scan Volume Settings
- Results are stored in the database
- Reporting Tool

GALAXY Client-Server-Structure / Application 2



GALAXY – Patient Data Import

Patient Administration:

▪Manual Administration

▪DICOM import

Add patient

pw_19421208 -- Peter Walter

General | Scan and tolerance settings

Patient ID: pw_19421208

Personal ID: 1587964525

Name: Peter Walter

Birth date: ☒ 12 December 1962

Room: Room 1

OK Cancel

DICOM-RT import

Patient ID	Patient name	Plan filename	StructureSet filename
CONVA270	CONVA1461 CONVA1000	RP.1.2.246.352.71.5...	
12345	LAP Galaxy	RP.dcm	RS.dcm
aw_19390530_001	Albert Wendisch	RP.dcm4.dcm	RS.dcm
rs_19520103_001	Regina Seebom	RP.dcm5.dcm	RS.dcm
fr_19490801_001	Frank Reich	RP.dcm6.dcm	RS.dcm
hhs_19200310_001	Hans Herman Siets	RP.dcm7.dcm	RS.dcm
is_19600423	Dr. Ilone Schroeder	RP.dcm8.dcm	RS.dcm

Directory: C:\LAPDicomRx

Open Cancel

- Breast

- Tumor position is well related to the skin.
- Matching based on the breast skin



- Head

- Solid body part
- Stable correlation between surface and tumor



- Prostate

- Increased positioning accuracy compared to room lasers only
- Matching based on Regions of Interest



Bilder entnommen: www.bmi-gmbh.eu

GALAXY – Installations

Sued-Harz-Hospital Nordhausen/Germany

- Multi-User System
- Installation in a Varian Linac Room
- IMRT – Treatment in routine
- Using the GALAXY and Portal Imaging for Patient Adjustment



- Installed 2007
- Goal: Technical investigation of the GALAXY System
- First patient study finished
- Poster on ESTRO 2008 by Torsten Moser
- Next study with 120 Patients to start soon



Feature to come: Gating module

***The Laser line will be positioned on the body's surface,
where the breathing amplitude is representative***

Real time data acquisition and processing

Comparision with 4D-CT-Image data set

Interface to Linac

The Gating Module is under development. Release Q2/2009

- No additional Setup time
- No markers
- Non-invasive
- No extra radiation
- High Precision Alignment
- User friendly intuitive Software
- State-of-the-Art Laser scanning system
- Network shared database
- Interface to Linac manufactures
- Interface to R&V Systems
- DICOM compatible

GALAXY is an optical system with visible Laser light
GALAXY views and scans the Patient's skin surface
GALAXY cannot look inside the Patient
There will be Patients, where skin and tumor have not
much relationship to each other

GALAXY – LIMITATIONS





Danke für's Zuhören!

