radiance, a software system for treatment simulation and analysis of radiation therapy administered with devices suitable for intraoperative radiotherapy (IORT), improves the safety of the treatment by enabling simulated visualization of the treatment outcome. The specialist can adjust parameters to achieve an optimized outcome without having to decide intra-operatively under stress.

In case intraoperative imaging is available, radiance is fully compatible with it, providing a complete and precise dosimetry study of the patient.
**MPR AND VOLUME RENDERING**

A state of the art 3D graphic engine provides high quality Multi-Planar Reconstruction (MPR) and volumetric visualization of the patient image in real time. You can rotate, pan and zoom in/out with no delay.

Isodose surfaces are overlayed over both 2D and 3D images.

The contrast window and opacity tables can be used to enhance the image to show anatomical elements and regions of interest.

The patient can be placed in both supine and prone decubitus positions.

*radiance* has a complete set of tools to accurately measure distances and angles within the scene.

**SIMULATION**

With *radiance*, the IORT applicators are modeled and the user can manipulate them to identify the entry points and its best location to optimize tumor bed coverage. The user can get an estimate of depth and the radiation of the tissues will receive for desired diameter and the angle of the applicator or the energy. The radiation oncologist can find an optimized solution before or during the intervention, thereby saving time and stress during intervention.

Two studies can be loaded at a time, allowing comparison of different scenarios of the same case or with another case. You can also compare pre-planning results with the post-planning (actual outcome).

**CONTOURING**

The contouring tools are used to identify the areas of interest, i.e., the tumor and its clinical volume, the area which is resected during the surgery and the remaining risky area which is treated during IORT; as well as to reproduce elements of the treatment, such as bolus and protections.

A full set of simple to use contouring tools plus interpolation between slices makes the process fast and reliable.
IORT DEVICES AND INDICATIONS

**radiance** works with either IORT devices like the INTRABEAM® System as well as all IOERT devices like mobile LINACs, and conventional LINACs.

**radiance** supports a complete set of applicators both for IOERT and IORT devices like the INTRABEAM® System.

**radiance** can be used in all indications for IORT suitable devices. That includes not only IORT itself, but also intracavity and surface techniques as well.

DOSE CALCULATION ALGORITHMS

**radiance** offers different algorithms for a fast and accurate dose calculation.

For **INTRABEAM®**:
- Dose Painting interpolates the PDD around the volume to generate a fast (<4 secs) first approach.
- Hybrid Monte Carlo adjusts a predefined phase space with the PDD of the applicator providing a fast (1-6 mins aprox) and accurate dose calculations with heterogeneity corrections.

For **IOERT devices**:
- Pencil Beam is a very good agreement between speed (<30 secs aprox) and accuracy in heterogeneous media (providing the limitations of the algorithm).
- Monte Carlo adjusts a predefined phase space with some PDDs and cross profiles providing fast (1-10 mins aprox) and accurate dose calculations in heterogeneous media.

Modeling the device in **radiance** is fast and simple. It needs a minimum set of measurements, and **radiance** provides tools to verify the generated model.

REPORTING

**radiance** records all treatment information generated with the system, including not only beam energy and applicator parameters, but also position and orientation (with respect to the patient and the LINAC), contours information, dose parameters and patient’s image.

This documentation can be stored before the treatment (in pre-planning phase) and also after the real procedures, registering all the final modifications from the original plan.

DICOM, DICOM.RT COMPLIANCE

**radiance** interfaces with the PACS to query and retrieve DICOM RT Structures and DICOM 3D images. These images can also be sent to **radiance** from any other DICOM node, such an external radiotherapy planning system.

**radiance** can export RT Structures and RT Dose files so that it can be fused with external beam radiation therapy plans in software applications which support registration and fusion of images and dose.
THE IORT PLANNING TOOL
- Covers all planning needs of an IORT procedure:
  - **pre**: the treatment situation is simulated and the treatment parameters are defined.
  - **intra**: the process is assisted by the previous planning. Modifications over the plan are registered.
  - **post**: the simulation is redone based on the real treatment for post-verification.

- Powerful and fast visualization and measurement tool introducing the 3D planning and dosimetry and high precision on geometrical distances (such as the treatment volume).

- Simulation of all important parameters in the process (surgical frame, applicator, LINAC, etc.).

- Dosimetry which considers different tissue densities and assistant materials (bolus and protections).

- Quantification on the received dose on all involved tissues (areas to be treated and areas sensitive to the radiation) by means of a DVH.

- Comprehensive reporting tool for a better post-analysis of the process.

- Validated by reputed specialists with many years of experience in IORT.

- Supports all requirements from AAPM TF48 & TG72 IORT studies

CLINICAL EVALUATION
Clinical evaluations carried out have shown that the users of *radiance* reach a high reproducibility level, improving their knowledge over the radiosurgical procedure itself.

The IORT plan, which is defined sometimes before the treatment, enables simulation of different scenarios and the interevaluation with other specialists (radiation oncologists, surgeons and physicists).