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# Brachytherapy Overview

Brachytherapy is a technique used to treat cancer tumors or plaque built-up within arterial walls. It uses tiny radioactive sources (the size of a grain of rice) that are inserted in the body through hollow plastic or stainless steel catheters into or close to the disease target site. There is a variety of radioactive isotopes that are employed in brachytherapy that includes gamma and beta (electrons and positron) emitters, low and relatively high energies (up to about 5 MeV at most). It is one of the preferred choice in many cases (due to its localized nature) and can be used in conjunction with external beam treatments.

Because of the energy regime within which this technique is applicable, the underlying physics governing the various interactions in Brachytherapy applications are solely driven by the low energy physics processes.

This page will provide relevant information pertaining to the ability of the Geant4 Monte Carlo toolkit in simulating Brachytherapy applications. We recommend the brachytherapy example distributed within the Geant4 source code as a good starting point for users not familiar with this toolkit.

# Brachytherapy References

## Talks

- GATE/G4 simulations of 125I brachytherapy sources, L. Maigne, September 2007
- Is there a need for the Monte Carlo method in clinical brachytherapy?, L. Beaulieu, May 2007
- Geant4 Monte Carlo characterization of novel electronic brachytherapy system, D. Liu, May 2007
- A Monte Carlo study of seed designs on the interseed attenuation in permanent prostate implants, H. Afsharpour, May 2007
- Monte Carlo dosimetry for prostate and breast cases in HDR brachytherapy, M. D' Amours, May 2007
- Dose rate distributions in radioactive eye plaque therapy by Monte Carlo, S. Veloza, May 2007

## Publications

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## Brachytherapy Groups

Below, are few links of groups that use Geant4 in Brachytherapy applications:

- Hampton University (USA) - Center for Advanced Medical Instrumentation [↗](#)
- Laval University (Canada) - Groupe de recherche en Physique Medicale [↗](#)
- Geant4 North American Medical User Organization -G4NAMU [↗](#)
- Geant4 European Medical User Organization - G4EMU [↗](#)

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Main Medical Physics page

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