# AAPM TG157

An Overview of Source Modeling and Beam Commissioning for Clinical Monte Carlo

#### C-M Charlie Ma, Ph.D.

Department of Radiation Oncology Fox Chase Cancer Center Philadelphia, PA 19111, USA



## **Learning Objectives**

- Understand the basics of Monte Carlo radiation transport and Applications in RT
- Understand the methods for Monte Carlo source modeling and beam commissioning
- Understand the goals and scope of the AAPM Task Group 157

Source modeling and beam commissioning for Monte Carlo dose calculation based radiation therapy treatment planning

C Ma, I Chetty, J Deng, B Faddegon, SB Jiang, JS Li, J Seuntjens, J Siebers, E Traneus

#### The AAPM Task Group 157 Report







### What is Monte Carlo Radiation Transport?

- Random sampling of particle interactions

   a good supply of random numbers
   probability distributions governing the physics processes
- Information obtained by simulating large number of histories

















### Applications of M-C in radiotherapy

- Fluence and spectrum calculations
- Dosimetric parameters (stopping powers, etc.)
- Correction factors (BSF, HS, PS, P/S ratio...)
- Dosimeter response simulations
- Treatment head simulations
- Treatment planning dose calculations

























### **Implementation of MCTP**

- Accelerator simulation
- Source modelingBeam commissioning
- AAPM TG-157
- CT data conversion and phantom setup
- Dose calculation algorithms
- Data processing and statistical analysis

AAPM TG-105 MC dose calculation for RTP (Chetty et al Med Phys (2007) 34: 4818-53)









# **Goals of AAPM TG-157**

- Review different beam model implementations
- Provide guidelines on types of tests needed for acceptance testing and commissioning of MCbased beam models
- Provide guidelines for tolerance criteria for acceptance testing and commissioning of beam models to be used for MC-based clinical dose calculation