

AbstractID: 5814 Title: A 3D Collision Avoidance Tool for External Beam Radiation Therapy Treatment Planning

**Purpose:** We are presenting the design and implementation of a 3D-graphical tool for the detection of potential collisions of various linac components for patient-specific external treatment planning

**Method and Materials:** The graphical tool uses the Virtual Reality Modeling Language (VRML) to model the exact geometry of any treatment machine by reading its manufacturer's CAD design files. The robust system is based on VRML and Java programming that allows for accurate simulation of any linac hardware module based on the manufacturer's CAD drawings.

**Results:** The tool predicted eminent collisions between different linac components graphically for a simulated Varian 2100EX for certain gantry and table angles. The collision angles were verified manually on the linac and found to agree with the predicted angles from the tool.

**Conclusions:** We have developed a 3D graphical simulation tool that can be used as a stand alone application to assist in external treatment planning by visually simulating collisions between various linac hardware components. Unlike other anti-collision methods developed so far in the literature, our tool would be able to model the details of the treatment linac and add-on devices for patient-specific setups. Hence, the tool will create patient-specific realistic collision maps for any external treatment scenario. The tool can be used as a stand-alone program and it is platform independent.