AbstractID: 8449 Title: A Virtual Linac for External Beam Radiation Therapy Treatment Planning

Purpose: A virtual linac is developed to graphically simulate external beam radiation therapy treatments in a 3D environment. The patient-specific simulation is useful for assessing potential collisions and for assisting patient setup.

Method and Materials: Interactive Data Language (IDL) is used to create the virtual reality environment. Geometry and dimensions of the simulated treatment devices, including accessories, are obtained from measurements of our own machines as well as limited use of schematics. DICOM filters are implemented to process the planning data exported from the treatment planning system.

Results: The patient's body contour, either outlined in the treatment planning system or generated by the IDL program from CT images, can be displayed as part of the 3D virtual linac. All machine components including the gantry, collimator, couch, and accessory selection can be adjusted interactively. Additionally, the patient's position on the couch can be translated in three dimensions. The result is the ability to accurately simulate almost any external beam treatment.

Conclusion: Since the 3D graphical models of the treatment units and the patient outline were established, the collision avoidance can be performed by visually simulating the treatment plan. Our virtual linac system includes add-on accessories such as the electron cones and the SRS head frames; users can easily measure the clearance of device-to-patient-couch and it does not need to use any complicated mathematical model. This virtual reality software provides highly intuitive images for both planners and therapists for designing treatment plans and positioning patients. It can be applied as a pre-treatment QA tool.