

AbstractID: 9297 Title: Three Dimensional Characterization of the Radiation Isocenter using a Single Phantom

**Purpose:** To provide a quality control procedure that characterizes the radiation isocenter of a linear accelerator simultaneously for collimator, couch, and gantry rotations. The primary question addressed is whether the three rotational axes cross each other within an acceptably small sphere. **Method and Materials:** A film stack phantom was constructed having four films suitably spaced apart. The phantom was placed in a fixed position on the treatment table, and a single reference frame was defined by registration marks. The combined use of Linac jaws and MLC created small spots on the films for each rotation axis. Special angles were chosen for the different axes so that three dimensional information was retrieved. The film spot coordinates were read using commercially available scanning software, and a computer calculation then rendered the data into a three dimensional display of the axes. **Results:** The procedure has been used nine times with reasonable results on four different accelerators. Comparisons of the minimum tangent circle radius using this method and standard star shots were favorable. In addition, the orthogonality of the axes and their orientations relative to a reference laser system was reported. **Conclusions:** This procedure is unique in that it provides, using simple commonly found materials, composite information about the radiation isocenter and all three rotational axes in a single measurement. It seems to offer the confidence needed to become a routinely used tool for the Linac annual check.