

## AbstractID: 3925 Title: Filmless radiation isocentre localisation using an electronic portal imaging device

**Purpose:** The increased availability of electronic portal imaging devices (EPID) on linear accelerators provides a capability to replace film with enhance standard commissioning and validation measurements. A series of EPID based measurements have been developed to confirm the coincidence of the radiation and mechanical isocentre with gantry, collimator and table rotation, eliminating the need for traditional star-shots films and enhancing the information gathered from such tests.

**Methods and Materials:** A precision phantom containing a set of radio-opaque markers was positioned at the mechanical isocentre using a calibrated front pointer. The EPID was positioned at an SID of 140 cm, and a series of images for a  $4 \times 10$  cm<sup>2</sup> were acquired in IMRT mode for different angular rotations of gantry, collimator and treatment table. Images were exported to a MatLab based program which automatically identified the position of the radio-opaque markers and field edges to determine the relative motion of the isocentre with angle.

**Results:** Measurements were performed with several different models of aSi imager found on Varian and Elekta Precise treatment units, and compared to the results of traditional star shot films. The measurements were consistent, with the radiation isocentre confined to a 2 mm diameter sphere. In addition, the EPID based tests provided additional information on the longitudinal motion of isocentre typically not available from film star shots.

**Conclusions:** EPID based measurements can replace the use of film in geometric verification tests typically performed during commissioning and annual quality assurance. These measurements are at the same time simpler to perform and analyze, while increasing the information extracted from the measurements and providing a reliable, user independent method of monitoring changes to the treatment unit isocentre over the lifetime of the machine.