# AbstractID: 2962 Title: High-Speed Scintillation Camera to Study IMRT Delivery

**Purpose:** The aim of this study was to accurately obtain the beam shape and fluence of all segments delivered during IMRT. We have developed an EPID employing a fast scintillator and a high-speed camera for this purpose.

**Method and Materials:** A commercial high-speed camera was combined with a Gd2O2S:Tb scintillator. The camera was equipped with an 8-bit CMOS sensor, the pixel resolution was 0.635 mm, and the exposure time was 2.5 ms (to capture the scintillation pulses with a decay time of 0.550 ms but smaller than the 2.8 ms accelerator pulse period). The camera was synchronized to pulses from the accelerator pulse-forming network and gated to capture every possible pulse emitted from the accelerator, at ~360 pulses per second. An onboard 6 GB memory card allowed the capture of 60 s of delivery. A comparison of the MLC instruction files, log files, and camera data for a 42 segment IMRT beam delivery was performed.

**Results:** The high speed camera allowed for capturing the delivered fluence without aliasing. Averaging 5 frames to 72 fps provided a signal-to-noise ratio that was sufficient to resolve leaf positions and segment fluence. The fluence from the log files and camera data agreed well except for the 1$^{st}$ segment where the log file appears to have missed the beginning of the delivery. The log files reported leaf motions at the end of 33 of the 42 segments. The camera measurements showed leaf motions in only 7 of the 42 segments.

**Conclusion:** The high speed camera was able to resolve the IMRT beam output shape and fluence. Leaf motions were observed during beam-on for step-and-shoot. We found that the log files do not accurately predict leaf motion. Finally, we note that the camera resolution is adequate to resolve dynamic delivery.