

## AbstractID: 11918 Title: DMLC IMRT tracking of moving anatomy - issues and solutions

DMLC tracking algorithms have emerged recently as a feasible solution of the delivery of intensity modulated radiation therapy in presence of motion of patient body anatomy. In this technique a MLC aperture, and beam dose rate, are dynamically adapted to trajectories of target and other organs in motion. There exist hierarchies of ever more sophisticated deliveries of this type that respond to increasingly realistic, and at the same time increasingly more complex, treatment conditions. The possibility of these various adaptations is rooted in multitude of leaf motions, and beam dose rate functions, that impose the same IMRT map over moving targets. Goals of tracking deliveries can evolve from finding solutions that are most time efficient to those that provide most benefit from dosimetric point of view.

The presentation will discuss cases of IMRT delivery to rigid and deforming targets, will consider situations when target motions are known and reproducible at delivery as well as situations when these motions are irregular and unpredictable. The disadvantages of unintended variation in delivery to organs at risk will be discussed for solutions that deliver planned intensities to targets during tracking, while disregarding motions of organs at risk when differential motions between targets and organs at risk persist. The possibility of using additional degrees of freedom of mutual motion between organs at risk and targets for the benefit of the therapy will then be presented. The method of using beam dose rate variation for benefiting DMLC delivery will be explained.

### Learning Objectives:

1. Understand the origin of the DMLC IMRT tracking.
2. Understand the issues related to DMLC IMRT tracking in presence of complex motions of body anatomy.
3. Understand the issues related to therapeutic advantage rooted in motions of body tissues at radiation treatment delivery.