

# Medical Physics Seminar

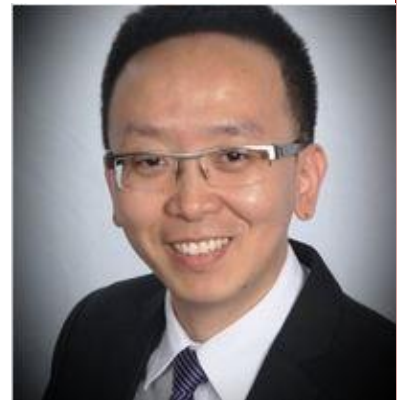
## Wednesday, August 5, 2015

### WIMR 3001A

### 11:00 AM-12:00 PM

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### **Dosimetric and Biologic Characteristics of the Flattened and Flattening-Filter-Free Beams of the Linac System**

In recent years, the potential application of the flattening-filter-free (FFF) photon beam in modern linac system has been a topic of significant interest. Compared to the flattened beams, the FFF beams have some apparent advantages, including reduced treatment time, lower scatter to organ at risk (OAR) and decreased neutron contamination. The primary objective of the research in this thesis has been to investigate the dosimetric and biologic characteristics of the flattened beam and the FFF beam of the TrueBeam (TB) system. Using the Monte-Carlo (MC) simulation, we have also investigated the possibility of further reducing the dose to OARs from the treatments delivered with 6 MV FFF beams. This project includes two different parts. In the first part, we evaluated the differences in treatment plans between the flattened beam and the FFF beam. In the second part, based on the VirtuaLinac system, a MC model was built to simulate the TB linac system. Based on our findings, we propose the concept of the SPECTER (soft-spectrum-filter) to further reduce the dose to OARs from 6 MV FFF beam using the static IMRT techniques. Clinical cases were used to investigate the impact of the SPECTER on the dose distributions. In the future direction of the project field size specific design of the SPECTER will be described.

**3001A WIMR      11:00 A.M. -- 12:00 P.M.**