

# Physics Rotation for Radiation Oncology Residents

## 1. Treatment room (Linac vault):

- **Observe patient treatments to become familiar with**
  - **linear accelerator controls**
  - **record and verify system, as used to deliver the radiation treatment**
  - **patient set up and patient-specific dosimetry**
    - **isocentric (SAD)**
    - **SSD**
    - **extended SSD**
    - **electrons**
    - **use of bolus, blocks and MLC**
    - **immobilization devices**
    - **in vivo dosimetry**
    - **gated treatments**

## 2. Dosimetry and Physics

- **Dosimetry**
  - **observe image import from CT, PET/CT, and MR scanners and from Stentor**
  - **observe import and export of images, contours and plans to D3 and other UPMC sites**
  - **observe image fusion – PET/CT, MR/CT and CT/CT**
  - **learn treatment planning tools**
  - **develop basic 2D & 3D plans**
  - **learn hand calculations on computer plans**
  - **learn gap calculations**
  - **time dose fractionations (TDF)**
- **Physics**
  - **observe daily machine QA's (linac and HDR) – get familiar with applicable tolerance limits on daily output variations of a linac and on mechanical parameters**
  - **observe monthly QA on linac and CT sim – get familiar with applicable tolerances and understand their impact on the accuracy of patients treatment delivery**
  - **If possible, observe annual QA on a linac and treatment planning systems.**
  - **observe and understand principles and limitations of in vivo dosimetry measurements using (as applicable)**
    - **TLDs**
    - **Diodes**
    - **MOSFET**

- observe physics plan checks
- observe and understand IMRT plan approval process
  - plan evaluation
  - plan verification by phantom validation and applicable tolerances
  - physics consultation report writing
- observe special procedures, as applicable
  - HDR
  - PSI
  - Vicromesh
  - TBI
  - 4D CT for respiratory gated treatments
  - Radiosurgery (Cyberknife, linac and Gamma Knife)
- understand regulatory issues concerning radiation safety, licensing and equipment calibration

### 3. Simulation

- observe CT simulation
- observe preparation of immobilization devices such as vac-bag, thermoplastic head mask, etc.
- observe preparation of custom boluses and internal shields, etc.

### 4. D3

- observe IMRT planning process
  - contours
  - dose prescriptions
  - dose constraints
  - plan optimization
  - plan evaluation

5. If possible get involved in current physics research and/or development projects.