Simulation Studies of X-Ray Conversion Targets for Radio Therapy Linacs

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Radiotherapy Linacs

- Medical linear accelerator (LINAC)
  - Deliver x-rays to irradiate a tumor
  - Destroy cancer cells while avoiding healthy cells

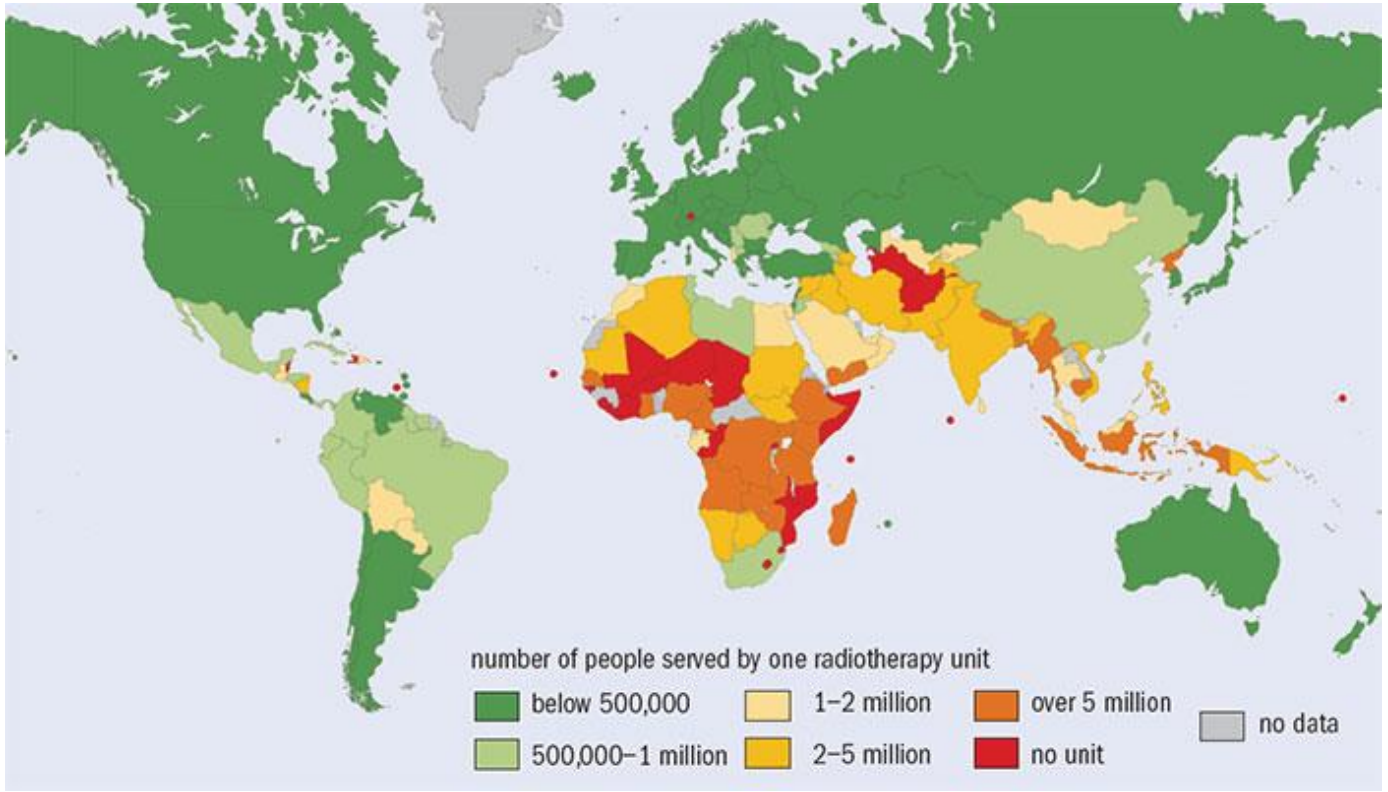
LINAC Operation

- Accelerated electrons collide with tungsten target to produce x-rays
- X-rays are shaped via multileaf collimator to target the cancer cells
- Beam exits via a gantry, which can rotate around the patient
    - Deliver x-rays to tumor from several angles
    - Minimize dose to healthy tissue

Pricing

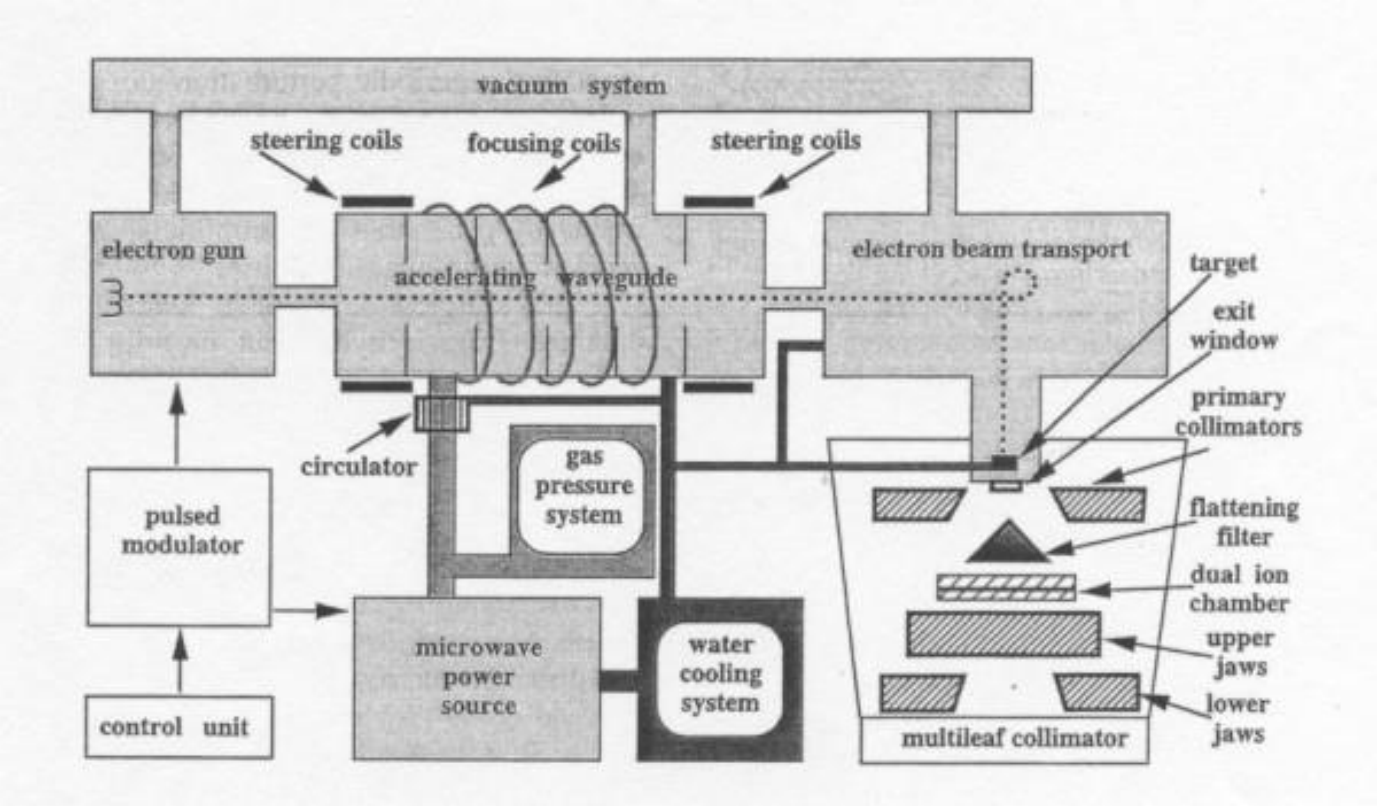
$175,000 to $1,500,000

Varian & Elekta



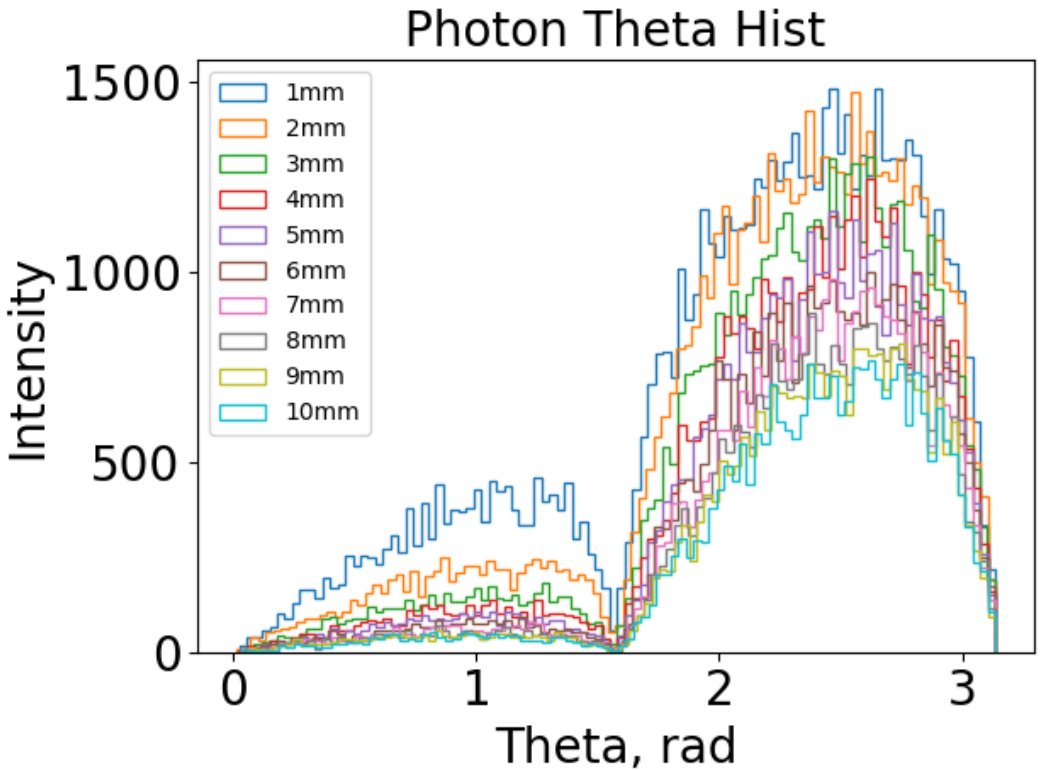
Project Aim

Study x-ray target for applications in radiotherapy linacs for developing countries

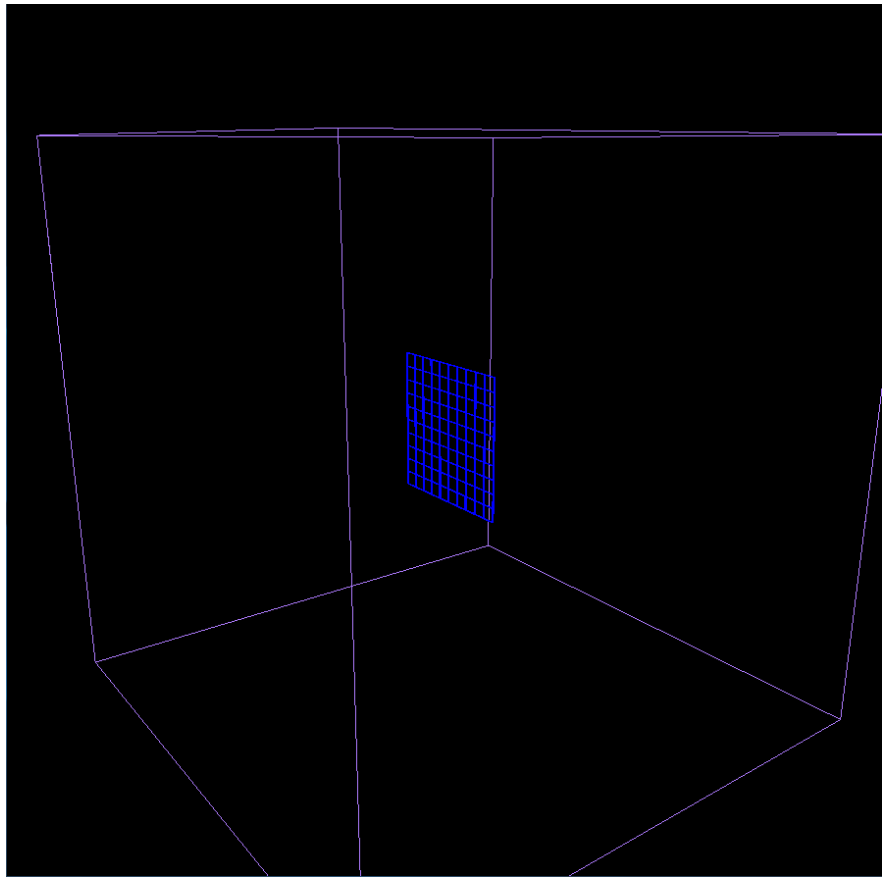


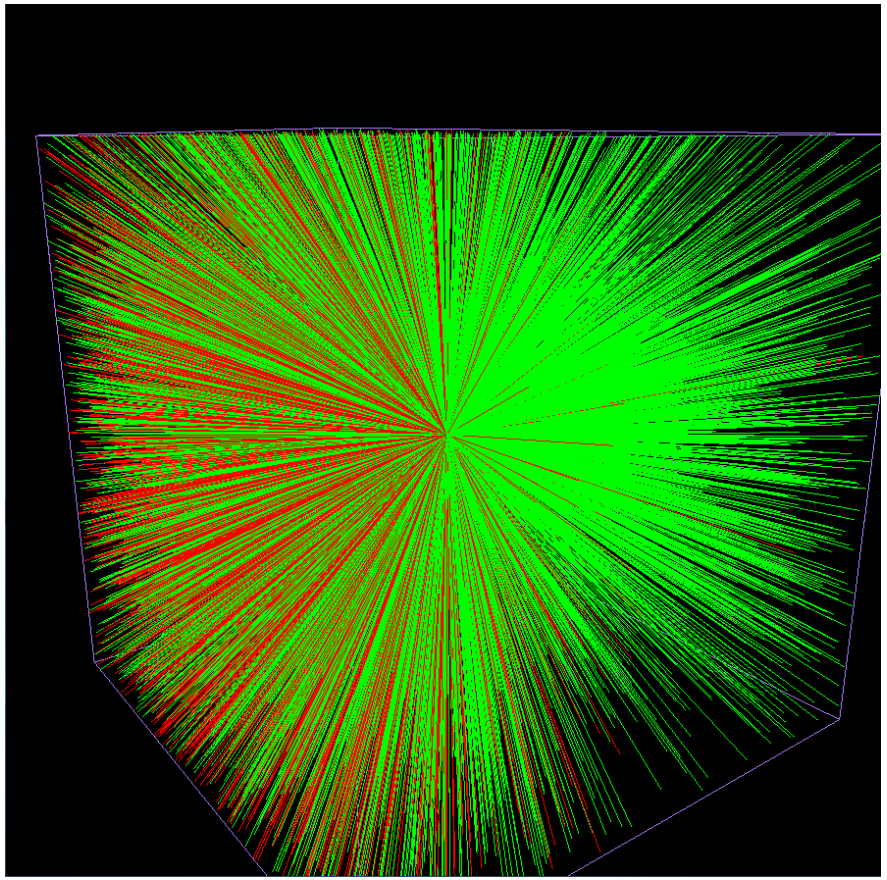
Simulations

- TOPAS
- Study interaction of 5 MeV beam of 10,000 incident e- on Tungsten targets
  - Thickness ranging 1 – 10 mm



Topas Simulations

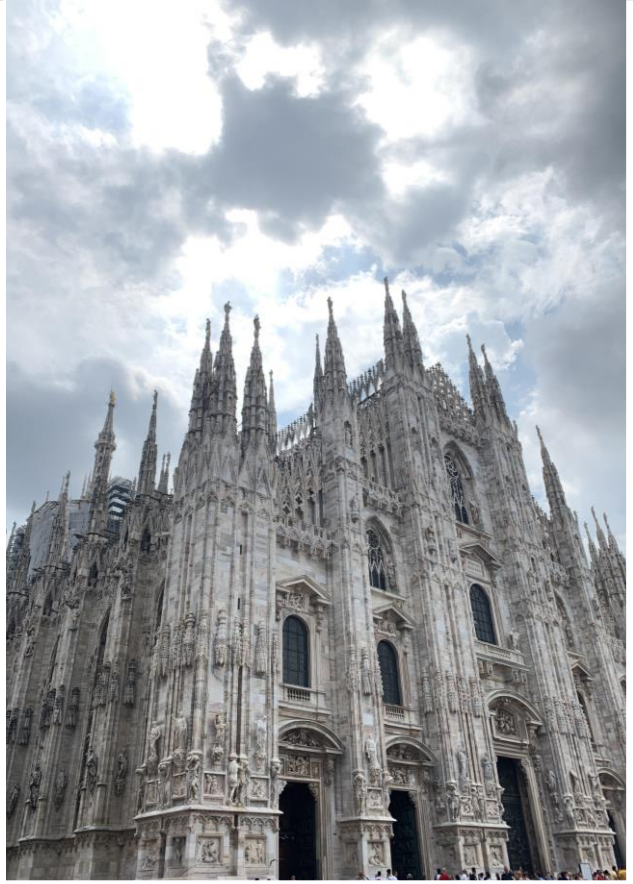




Next Steps

- Continue to study distribution of outgoing photons
- Calculate cross section of Bremsstrahlung photons
- Include patient in simulation
  - Calculate dose
- End goal: description of optimal target that could be implemented in radiation therapy linacs






Excursions

Questions?