Azure Cloud/GPU Based Radiation Dose Computation

- Implement a GPU based dose computation algorithm in the Azure cloud on multiple GPU with a simple web page user interface.
- **What Students Will Do:** Establish a container that can be executed on the Azure cloud that computes dose on a CT scan from a set of treatment beam definitions. This will require reformatting existing CUDA and D dose computation code to run in the container and take advantage of the cloud based GPU resources.
- **Deliverables:**
  - Code to run dose computation in container on Azure platform
  - Simple website to upload the CT and treatment beam information (DICOM or JSON)
  - A remedial display on the web page to view the dose on the CT
  - A capability to modify a beam parameter and see dose change on the display – goal would be interactive dose updates.
- **Size group:** 2-3 (1 possible, with downscaling)
- **Skills:** Azure development, CUDA, C/python/D
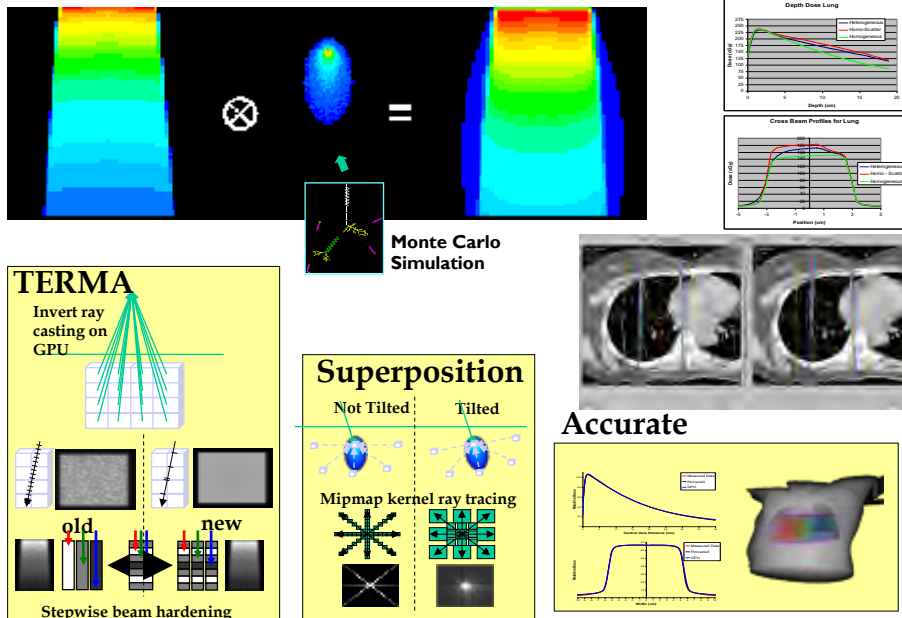- **Mentors:** Todd McNutt, Pranav Lakshminarayanan, Julie Shade

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1

Fast Convolution/Superposition Dose Computation on GPU

Monte Carlo Simulation

TERMA

Invert ray casting on GPU

old   new

Stepwise beam hardening

Superposition

Not Tilted   Tilted

Mipmap kernel ray tracing

Accurate

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2

Architecture - ish

Azure

Container
- C/D/Python
- I/O
- Distribute control points off to GPU

GPUs

- CT
- Tx Beams
- Dose Comp Parameters

3D Dose

600.456/656 CIS2 Spring 2021

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