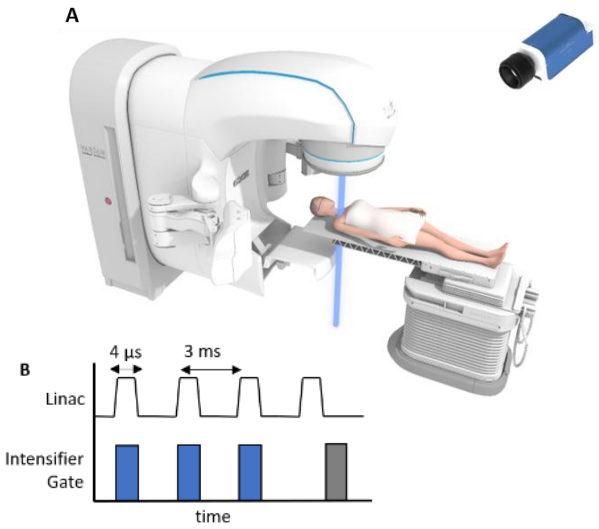
New England Chapter Meeting 2026

Patient-Centric Cherenkov Imaging Via 3D Surface Fusion

Alexander Geiersbach[1], Daniel A. Alexander[1,3] David J. Gladstone, ScD[1], Allison Matous, MD[2], Lesley A Jarvis, MD[3], PhD and Petr Bruza[1]

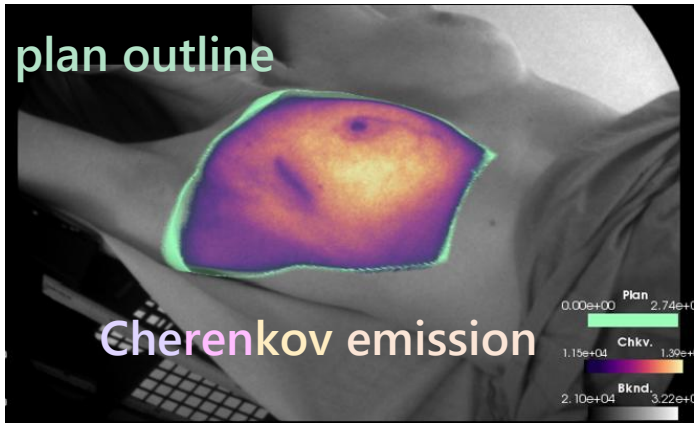
[1]Thayer School of Engineering, Dartmouth College, Hanover, NH, [2]Dartmouth Health, Lebanon, NH, [3]Dartmouth Cancer Center, Lebanon, NH

Cherenkov Imaging



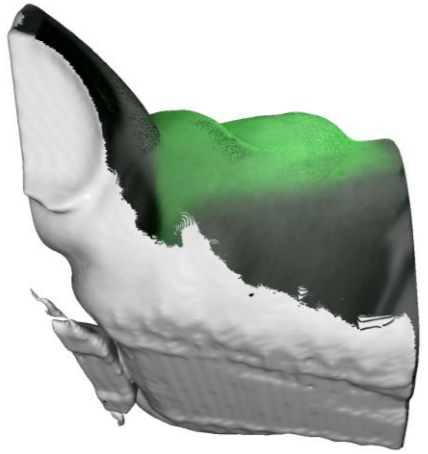
- Gated cameras visualize radiation delivery in patients “for free” during radiotherapy treatments

2D Image Analysis



- Restricted to single camera views and limited by gantry occlusions
- Valuable qualitative information, but difficult to determine quantitative metrics

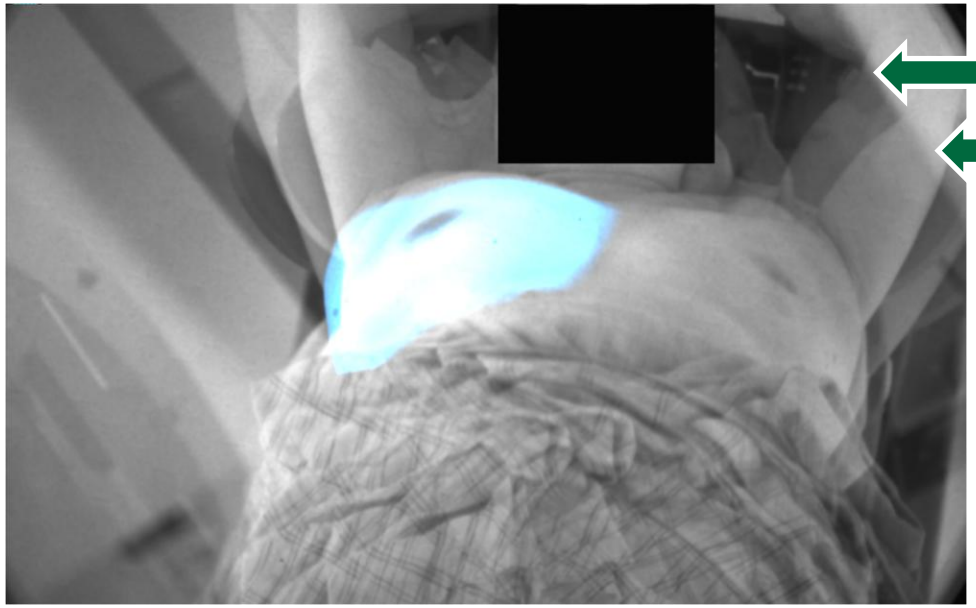
3D Surface Imaging



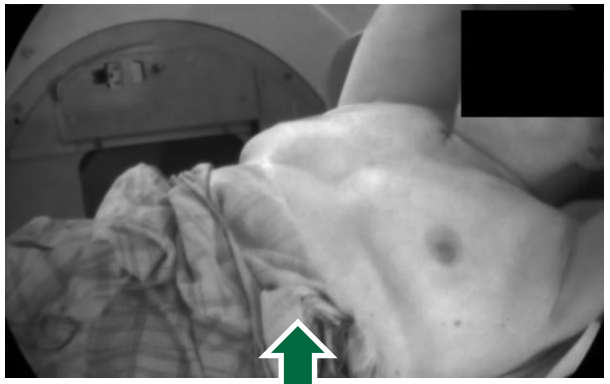
- Utilizes *all* camera views in a combined surface projection
- Provides quantitative analysis of beam’s eye view and spatial beam deviations on patient surface

The Problem

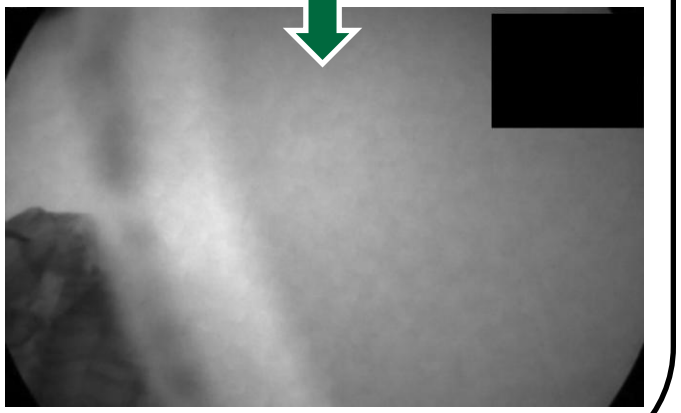
- **Gantry and couch rotations make image analysis difficult**
- **No quantitative spatial measurements in 2D for treatment verification**
- ***How do we use it clinically?***



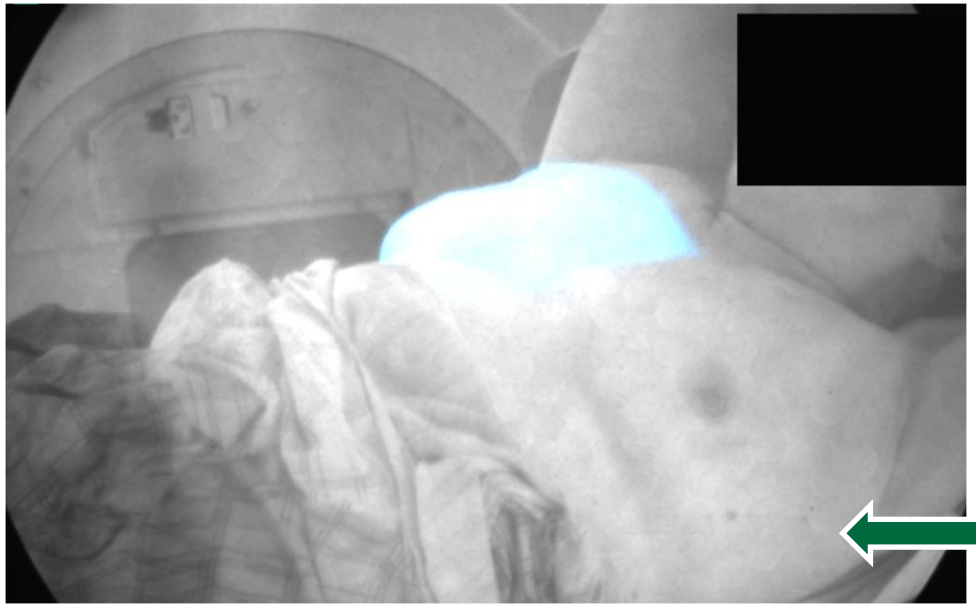
Treatment images with couch kicks have motion blur artifacts



Occluded at 356 Degrees



Visible to the camera at couch angle of 5 Degrees



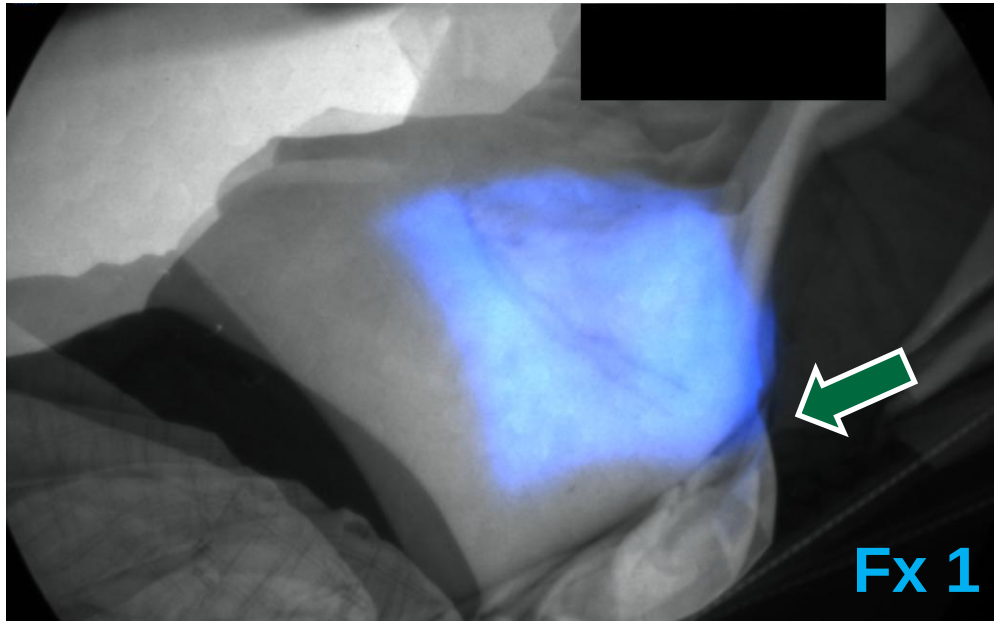
Semi-occluded views generate image intensity artifacts

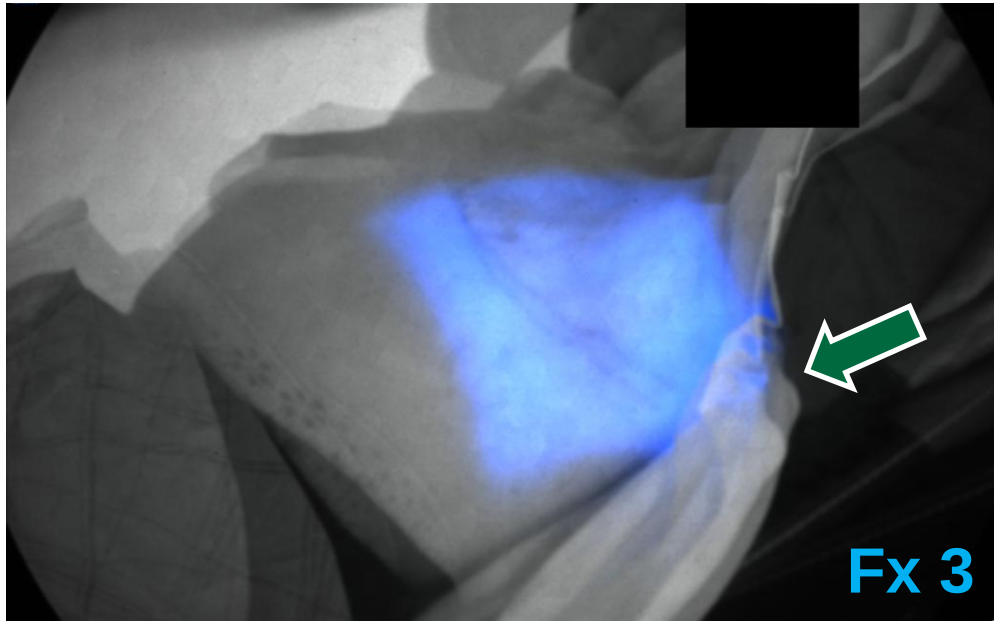
The Solution

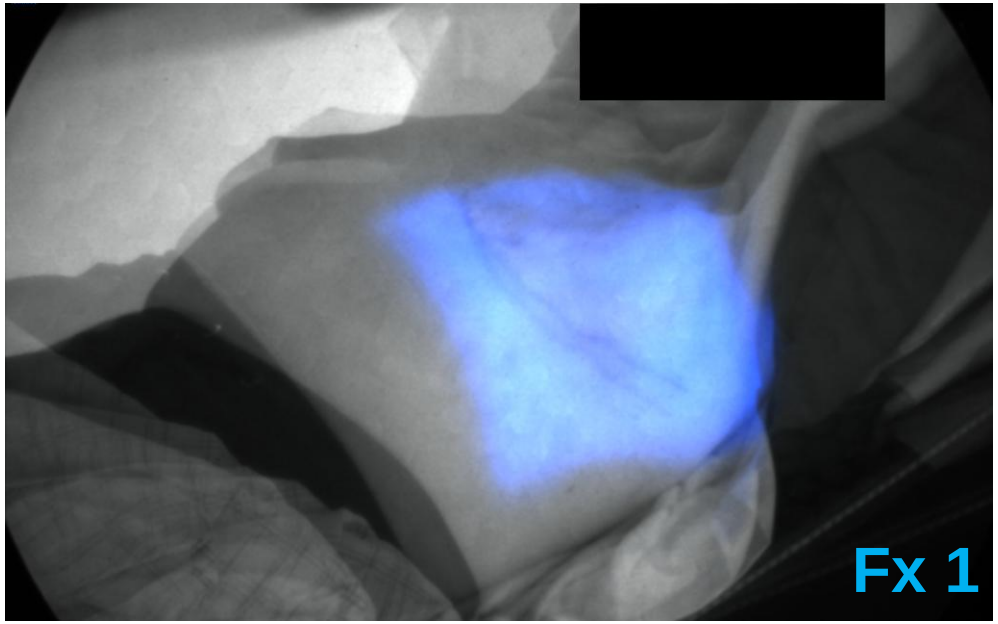
- **Project 2D images onto 3D surfaces**
- **Quantify the deviations between predicted and delivered treatments in patient centric coordinates**
- **Use DoseDot point measurement to ensure treatment verification**

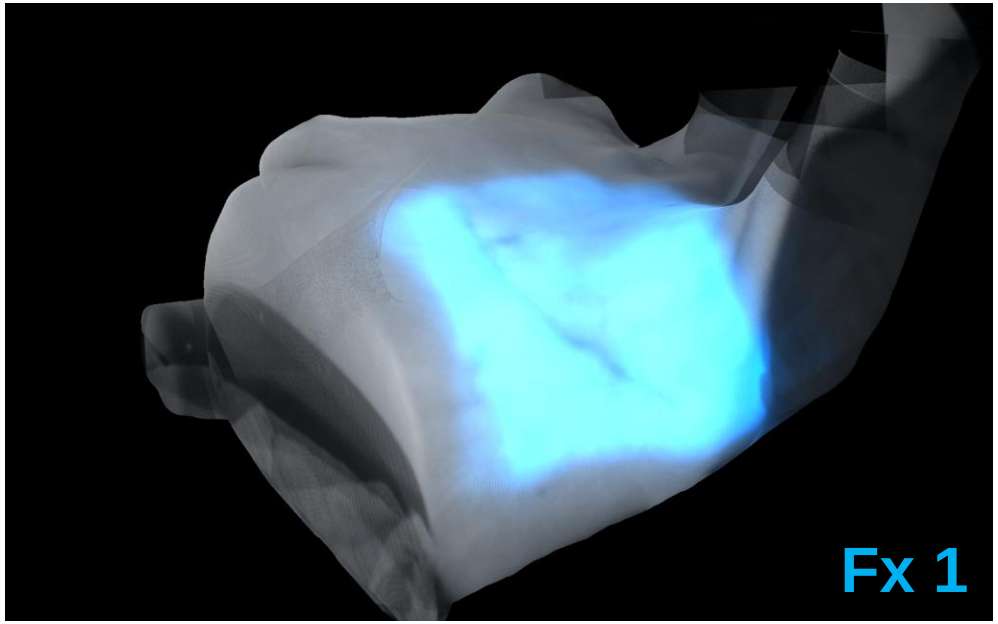
Clinical Case

- Image intensity is compromised because of gantry occlusion
- Image is hard to qualitatively interpret because of motion artifacts
- Clear setup difference, but is this clinically impactful?

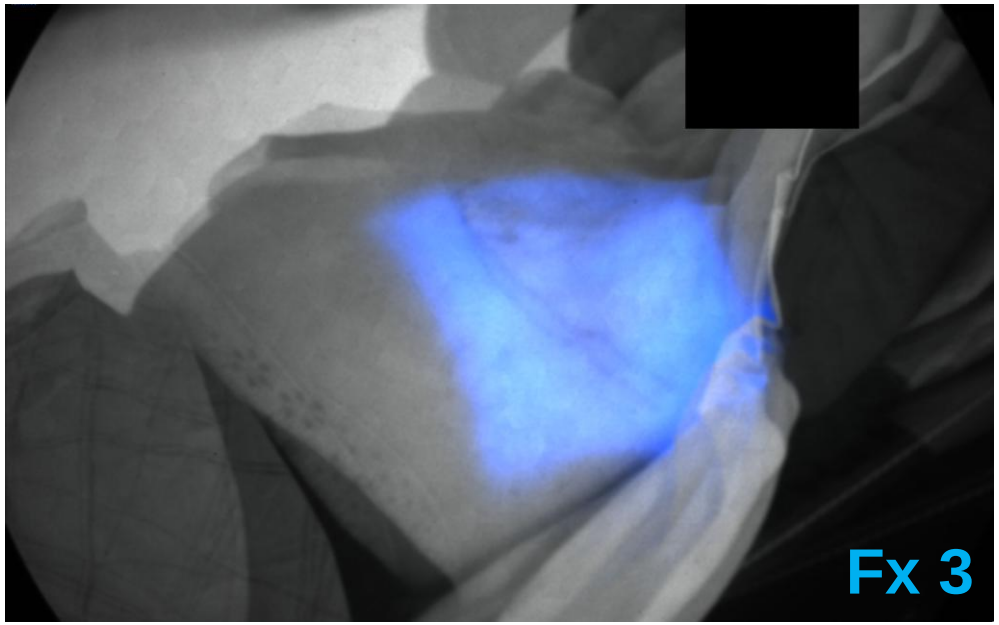


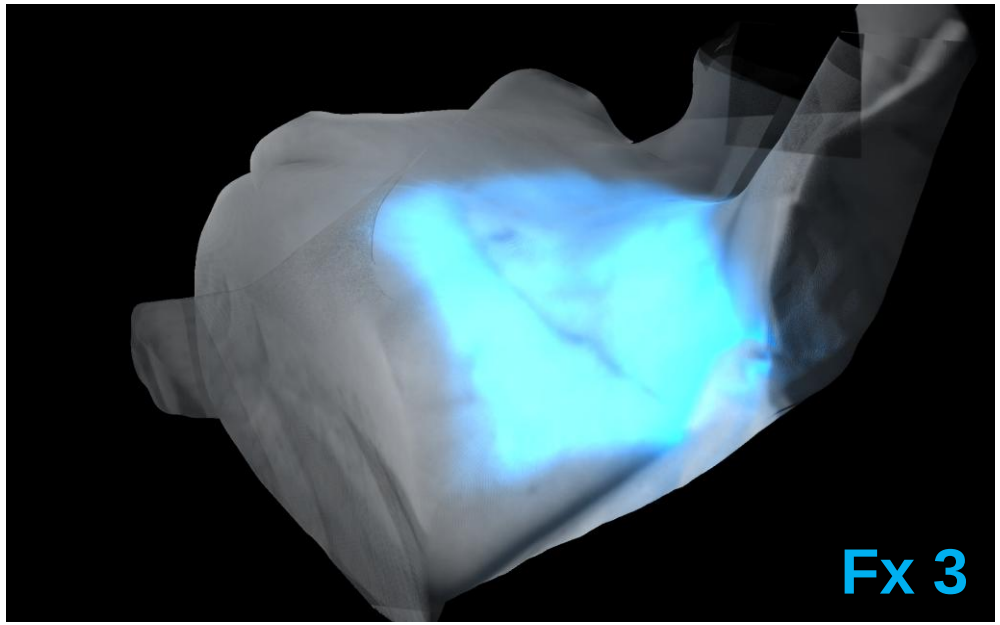






- Motion and intensity artifacts removed



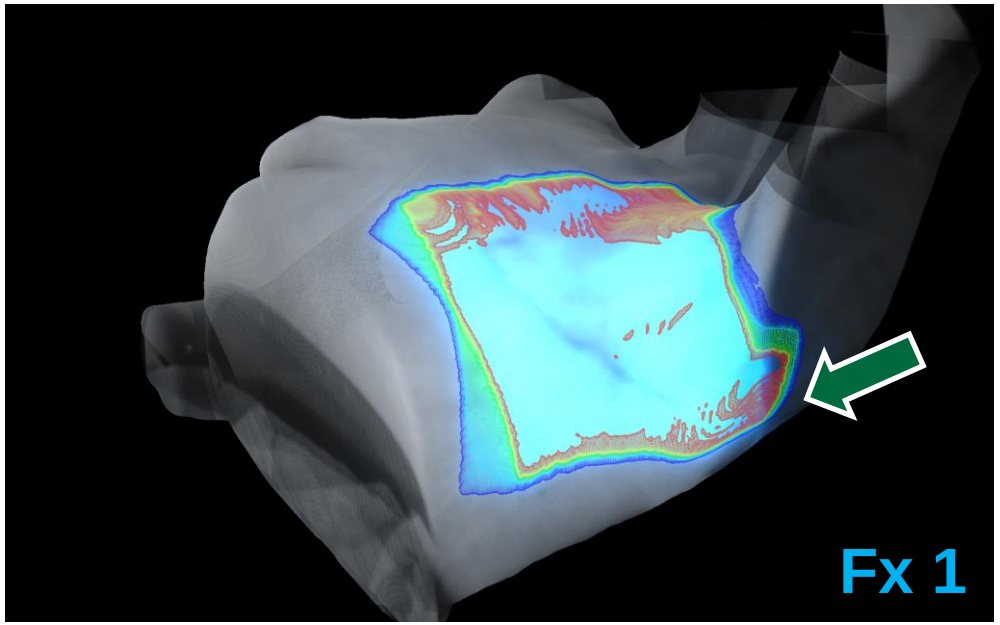


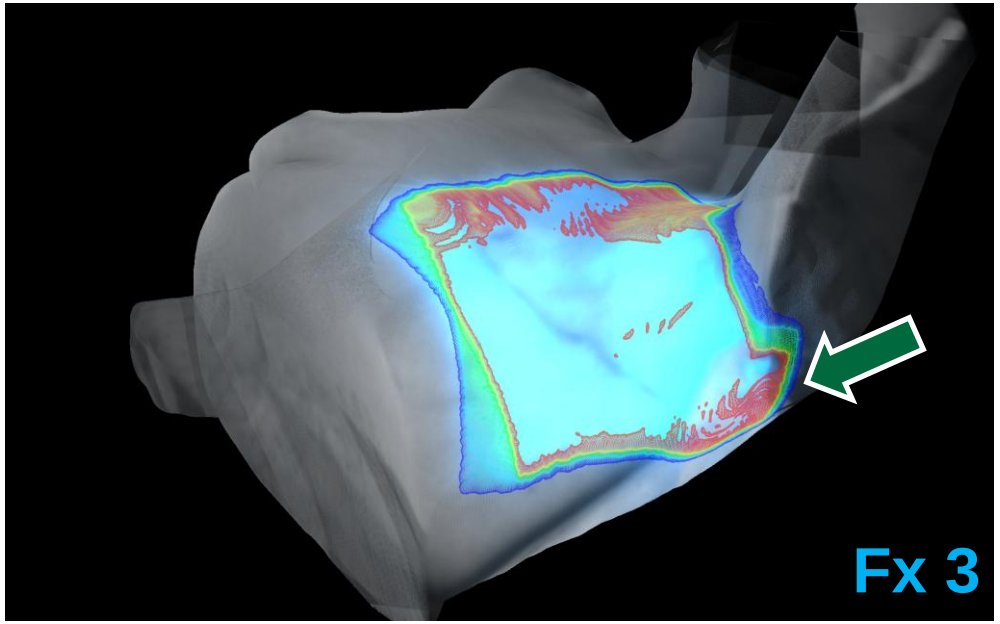
- Still difficult to determine the clinical impact of the setup error

Patient Centric View

- Isodose (10% Blue -90% Red) surface lines on patient surface enable easy visualization of treatment

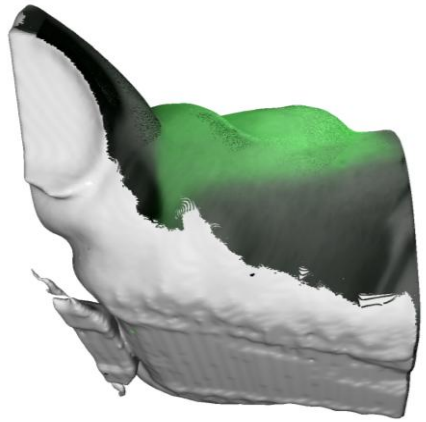
- Allows physicians to determine whether to change/monitor future fractions





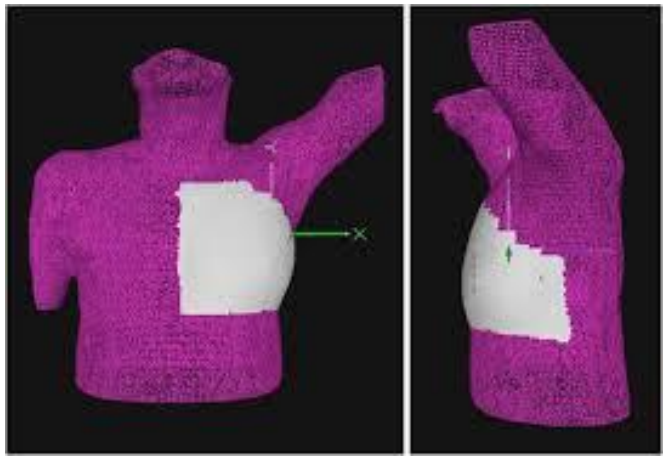
Future Directions

3D Surface Imaging



- Created and validated a projection framework to link 2D images to 3D surfaces via projection
- Generated virtual cumulative images and surface dose beam overlays

Detecting and Quantifying Treatment Incidents



DoseDot Localization

Thank you!

DARTMOUTH ENGINEERING
THAYER SCHOOL

Dartmouth Health

AAPM

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DOSEOPTICS

CENTER FOR IMAGING MEDICINE AT DARTMOUTH

Questions?

Alexander.Geiersbach.TH@Dartmouth.edu

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engineering.dartmouth.edu