Patient Centric Cherenkov Imaging of Non-Coplanar RT via 3D Surface Fusion

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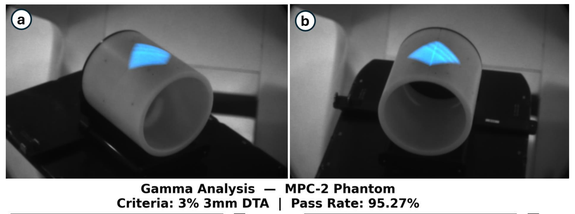
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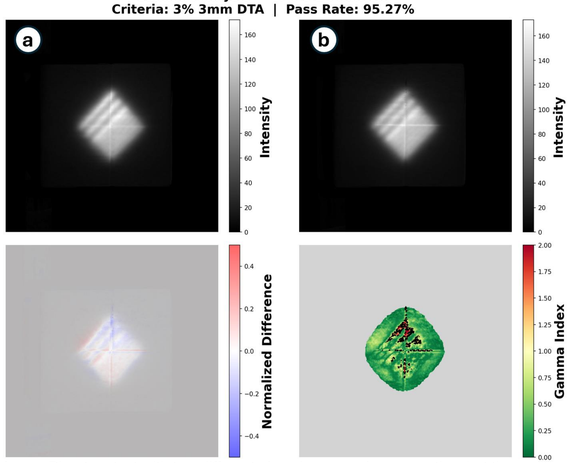
OVERVIEW

Cherenkov imaging provides valuable beam delivery information, but fixed treatment camera positions are subject to gantry occlusions and couch rotation artifacts that inhibit imaging for a significant percentage of clinical cases. To overcome these limitations, we introduce a patient centric approach to Cherenkov imaging where 2D images are projected and fused onto 3D patient surfaces to generate patient centric images.

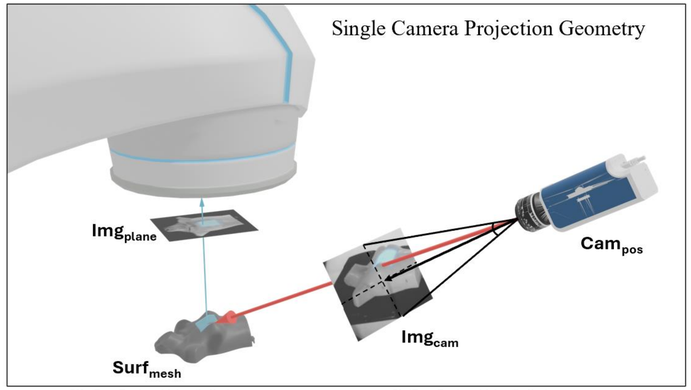
Projection methods were verified via a phantom study. 8 patient cases involving couch kicks were analyzed and the beam deviation was quantitatively measured in the beam's eye view (BEV) images.

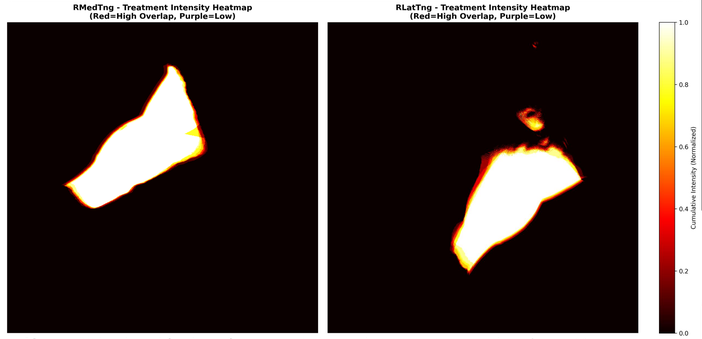


Gamma Analysis — MPC-2 Phantom
Criteria: 3% 3mm DTA | Pass Rate: 95.27%

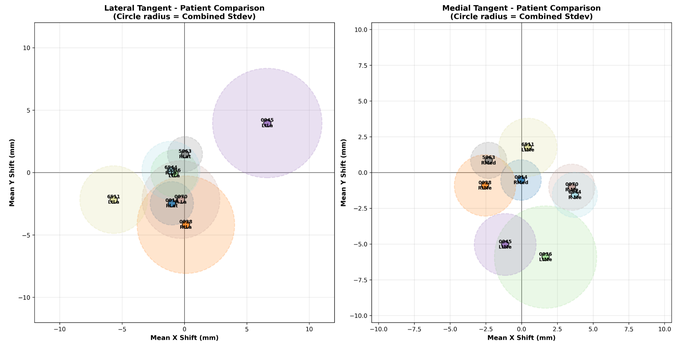


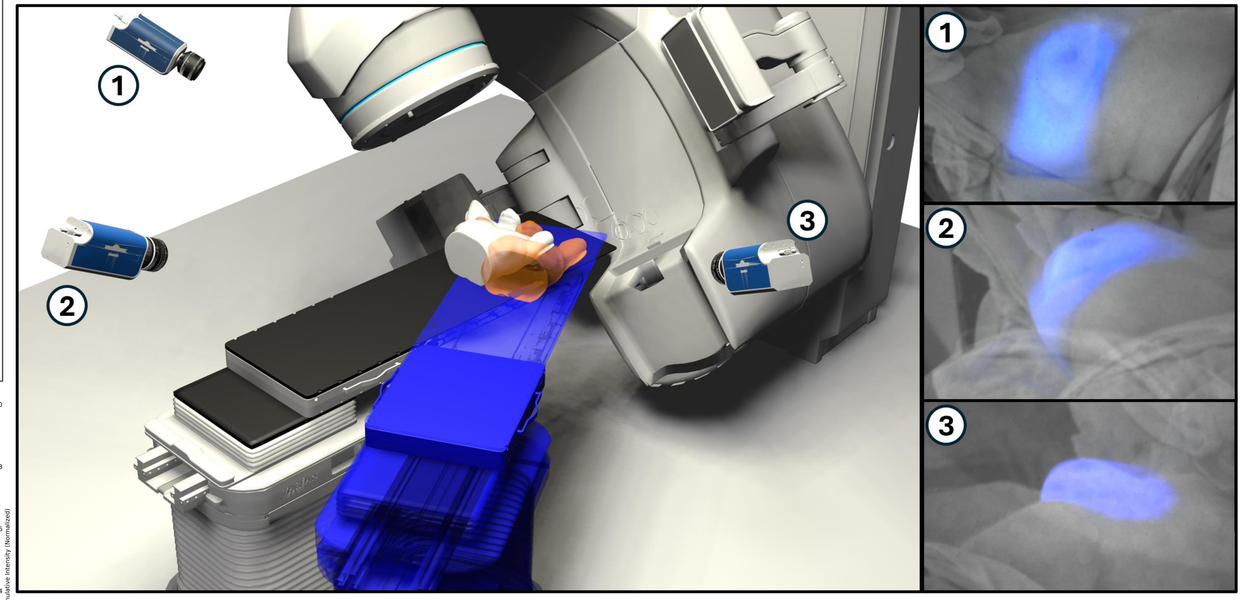
Above: Phantom test with two different plans in camera's perspective, but the same plan in patient centric view. Beam's Eye view gamma analysis achieves 3% 3 mm





Above: All treatment fractions from a single tangent plan overlayed in Beam's Eye View
Below: 8 Patient datasets BEV average shift by field in mm with standard deviation as the radius





Above: Example of non-coplanar treatment delivery. (1), (2), (3) show Cherenkov images with motion artifacts due to couch rotation during treatment
Below: Patient centric projection images (4), (5), (6) eliminate motion artifacts from cumulative images (1), (2), (3) to localize treatment on patient surface

