Optical Calorimetry for Radiation Dosimetry

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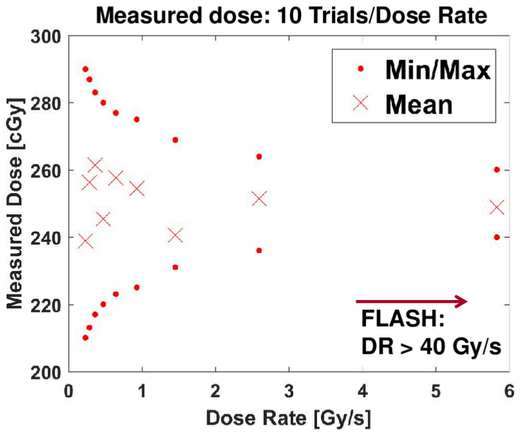
BACKGROUND: Optical calorimetry determines **absorbed dose to water** by **non-invasively** measuring heat induced refractive index changes caused by radiation.

METHODS:

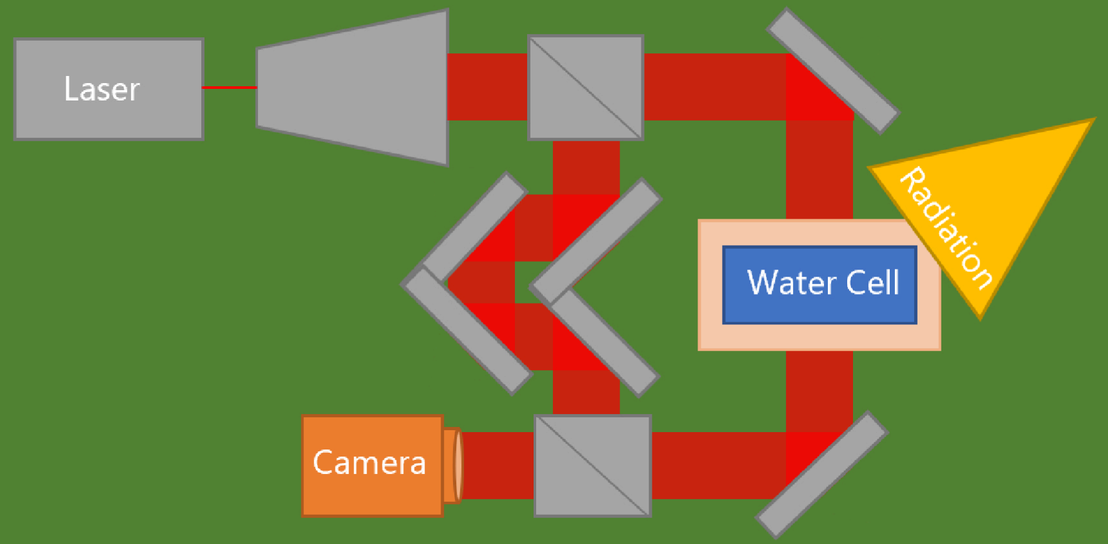
1. The optical calorimeter was modelled in FRED and validated against experimental results.
2. Custom built phantoms were used to drive design refinements, improving spatial and phase resolution.
3. The absolute dose uncertainty of the refined dosimeter was tested in a 6 MV FFF photon beam. Dose rate was adjusted by varying SSD.

RESULTS: At a dose rate of 6 Gy/s the measured dose uncertainty reduced to 2.5 ± 0.2 Gy.



CONCLUSION: Reduced uncertainty at higher dose rates indicates potential for use in techniques such as microbeam and **FLASH radiotherapy.**

Optical Calorimetry is a novel technique for the dosimetry of high dose rate radiation beams via interferometry.



Read More:

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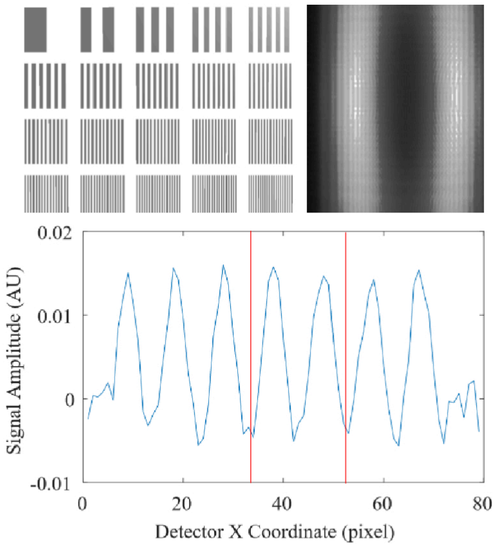
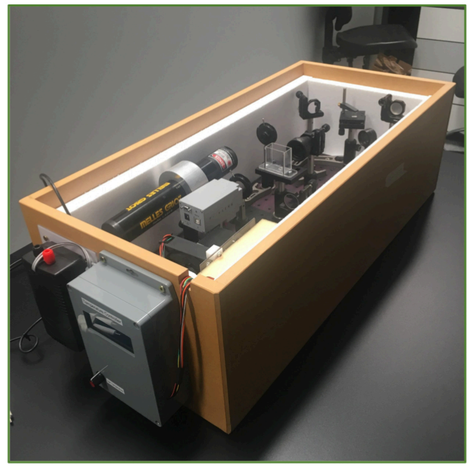


CW from top left: 1) Line pair phantoms modelled in FRED. 2) Holographic reconstruction of a modelled line pair phantom, captured by the dosimeter. 3) The profile across the reconstruction shows clearly resolved line pairs.



The optical calorimeter prototype, complete with temperature-controlled housing.

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