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Image-guided radiotherapy using active pixel technology

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The intelligence, read-out speed, radiation hardness and large size of CMOS active pixel sensors (APS) gives them a potential advantage over current radiotherapy verification systems. This work investigates the feasibility of using an APS to image the megavoltage treatment beam produced by a linear accelerator, and demonstrates the logic which may be used to evaluate treatment and track motion. A CMOS APS was incorporated into an imaging system, and anatomical imaging, resolution and contrast were evaluated. Two algorithms were used to determine the field-area, delivered dose and the position of collimator leaves in an intensity-modulated radiotherapy treatment. Results agreed with the prescription to within a single frame for dose delivery, and 0.03 cm for the position of collimator leaves. Such a system therefore shows potential for online verification.

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