High dose rate (HDR) brachytherapy (BT) is a well-established cancer treatment modality that requires accurate localization of source holders with respect to the tumor and nearby critical structures. Accuracy of localization is significantly improved with computed tomography (CT). In this presentation we describe a solid state 8-channel detector designed for use in a novel CT scanner that utilizes an ^{192}Ir HDR BT source to provide the photons needed to form a image of the patient instead of an *x*-ray tube. Each channel consists of an 0.8x0.275x1.0 cm^3 $CdWO_4$ scintillating crystal coupled to a pair of photodiodes, a switched-capacitor integrator, a low-pass-filter-gain stage (gain = 47, f_c = 339 Hz), a sample-and-hold circuit and an 8:1 analogue multiplexer.

The detector response is linear over a range of about 10^3 and the electronic noise floor is 115 μV. Using a 5.3 Ci ^{192}Ir source located 82.5 cm from the detector, the signal-to-noise ratio (SNR) with no attenuation in the path of the beam is 118; with 41 cm of Plexiglas placed between the source and the detector, the SNR is 12. The detector signal is much larger than the electronic noise floor up to at least 43 cm of Plexiglas, demonstrating that this detector is well-suited for use in an ^{192}Ir-based CT scanner. Preliminary images of biological specimens obtained using the detector in a first generation CT geometry show bones and soft tissue. Images of phantoms show BT needles without beam hardening artifacts.