# CMOS CAMERA SENSOR FOR DETECTION AND IMAGING OF PARTICLES OF IONIZING RADIATION

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The ionizing radiation dosimeter was developed using a CMOS sensor from a 1MP camera, with an exposed silicon detector. The detector was placed in a 3D printed casing with an aperture in the lid to allow ionizing radiation to pass through. The module was shielded against optical photons and RF noise. For each measurement, 200 raw frames were captured, which were then processed in a Python program. The results obtained showed the number of high energy photons detected during the measurement period.

The calibration of the equipment was carried out using electrons from Sr-90 beta source emitters, comparing detected particle flux with declared parameters of the samples, achieving 5-8 percent uncertainty. A PHAROS (Light Conversion) femtosecond laser (wavelength - 1028 nm, pulse energy Ep - 1.5 mJ) was used to generate X-rays via inner-shell ionization. The laser beam was focused on a 30 μm diameter spot on the surface of a rotating copper disk. The flux of the X-ray source produced by the high-power laser radiation was examined while the optical power of the laser beam was incremented from 1 W to 6 W.

Results obtained were compared with a Si(Li) X-ray spectrometer (Amptek X-123), determining that the CMOS dosimeter successfully recorded a more intense X-ray flux compared to the X-ray spectrometer, which saturated at higher laser energies and was unable to detect a portion of the photons due to having a single sensor, opposed to the CMOS detector able to detect with 105 detection points. It was also found that the number of X-ray photons peaked when the optical power of the laser was set at 4 W and diminished afterwards with increasing power levels. Air ionization was also observed, but as expected, did not generate detectable X-rays.