Contribution ID: 136

Type: poster

Single-Photon Avalanche Diode detector for Raman spectroscopy with time-gated fluorescence suppression.

Wednesday 15 September 2021 10:22 (1 minute)

Single-photon avalanche diode (SPAD) detectors are revolutionising modern imaging and spectroscopy thanks to detection capabilities at the level of individual photons and ultrafast response times. Very recently, time-gated cameras based on SPAD technology have been proposed for improving the performance and applicability of Raman spectrometers through addressing the suppression of fluorescence interference in the most commonly used, near infrared spectral region –one of the greatest, largely unmet, challenges in modern Raman spectroscopy. The effectiveness of existing solutions is at present restricted to a small subset of samples and regimes of operations due to their poor near-infrared (>800 nm) sensitivities, low frame rates and small 1D array formats.

To deliver a step-change in Raman detection capabilities, we propose the development of a SPAD sensor chip having near-infrared enhanced sensitivity (optimised for 750-950 nm), larger format (architecture scalable up to 1000x250 pixels) and timing resolution on the order of a few hundred picoseconds. The chip which will combine SPAD devices with an on-chip Delay Locked Loop (for timing accuracy), advanced counting architecture (for high light level applications) and a high speed readout (for high frame rates up to 40 Mfps). The design of the chip has been completed and submitted for fabrication in a 180 nm CMOS Image Sensor process. In this paper, we present the architecture of the device and discuss plans for future testing.

Your name

Herman Larsen

email

herman.larsen@stfc.ac.uk

Title

Mr

Nationality

Norwegian

Institute

STFC

Authors: LARSEN, Herman (Science and Technology Facilities Council); SEDGWICK, Iain (STFC); Dr CIAF-FONI, Luca (STFC); Prof. MATOUSEK, Pavel (STFC); Dr WALTHAM, Nick (STFC); GUERRINI, Nicola Carlo

Presenter: LARSEN, Herman (Science and Technology Facilities Council)

Session Classification: Posters Session 1 (Applications in Astro-particle Physics; Applications in Astronomy, Planetary and Space Science; Applications in Life Sciences and Biology)

Track Classification: Applications in Life Sciences and Biology