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Development of advanced Radiation Portal Monitors (RPM) for high-speed RN detection

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Development of advanced Radiation Portal Monitors (RPM) for high-speed RN detection



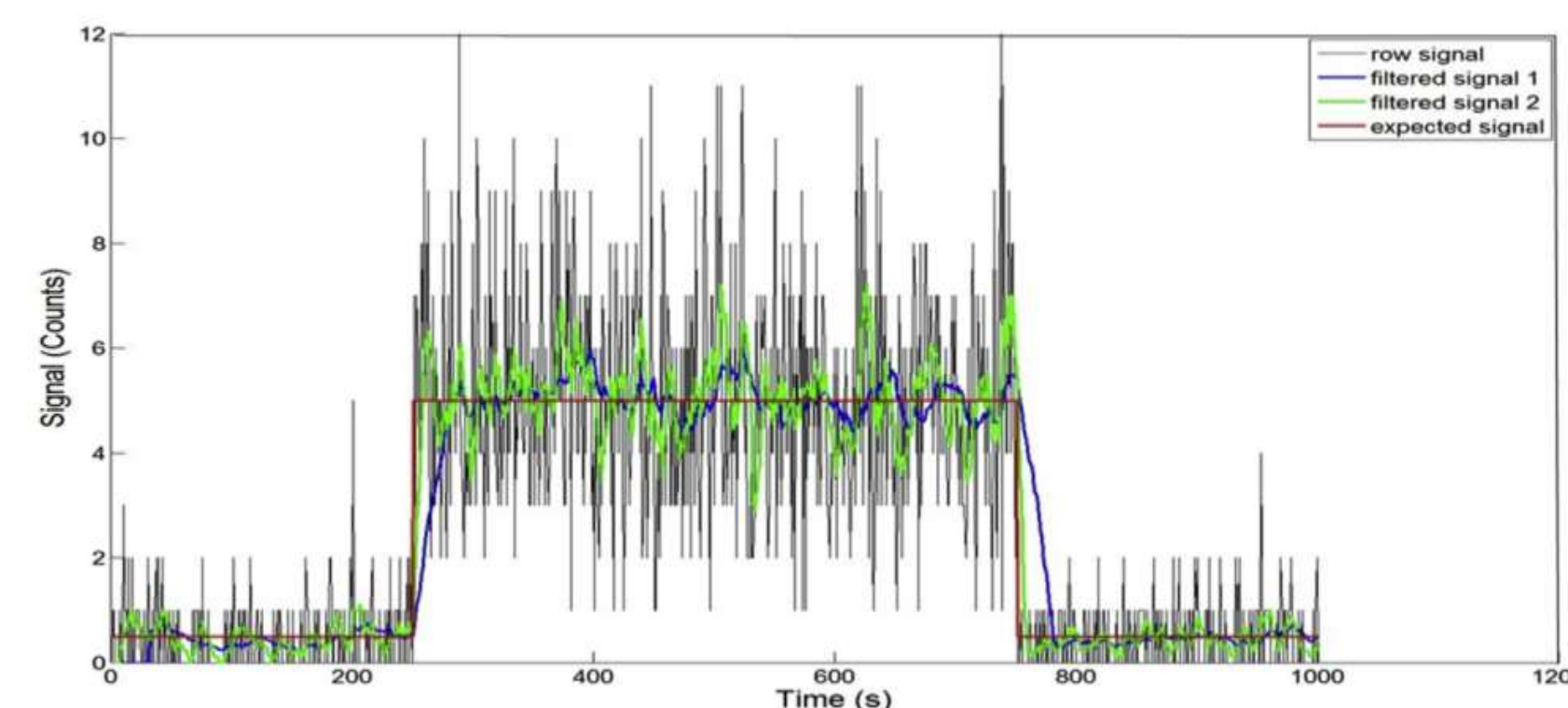
CEA/DRT/List/DM21/SCI/LCAE – Axel Tiberinus

CHALLENGE of entrance project

To address a complex landscape of threats, which include counterfeit products, new psychoactive substances, nuclear and radioactive materials, and sensitive dual-use technologies, EU customs authorities need innovative and reliable technologies. For nuclear and radioactive materials, CEA-LIST develops in collaboration with BERTIN Technologies A Radiation Portal Monitor to control vehicles that can travel at speeds higher than those specified in the standards for RPM (ANSI 42,35)

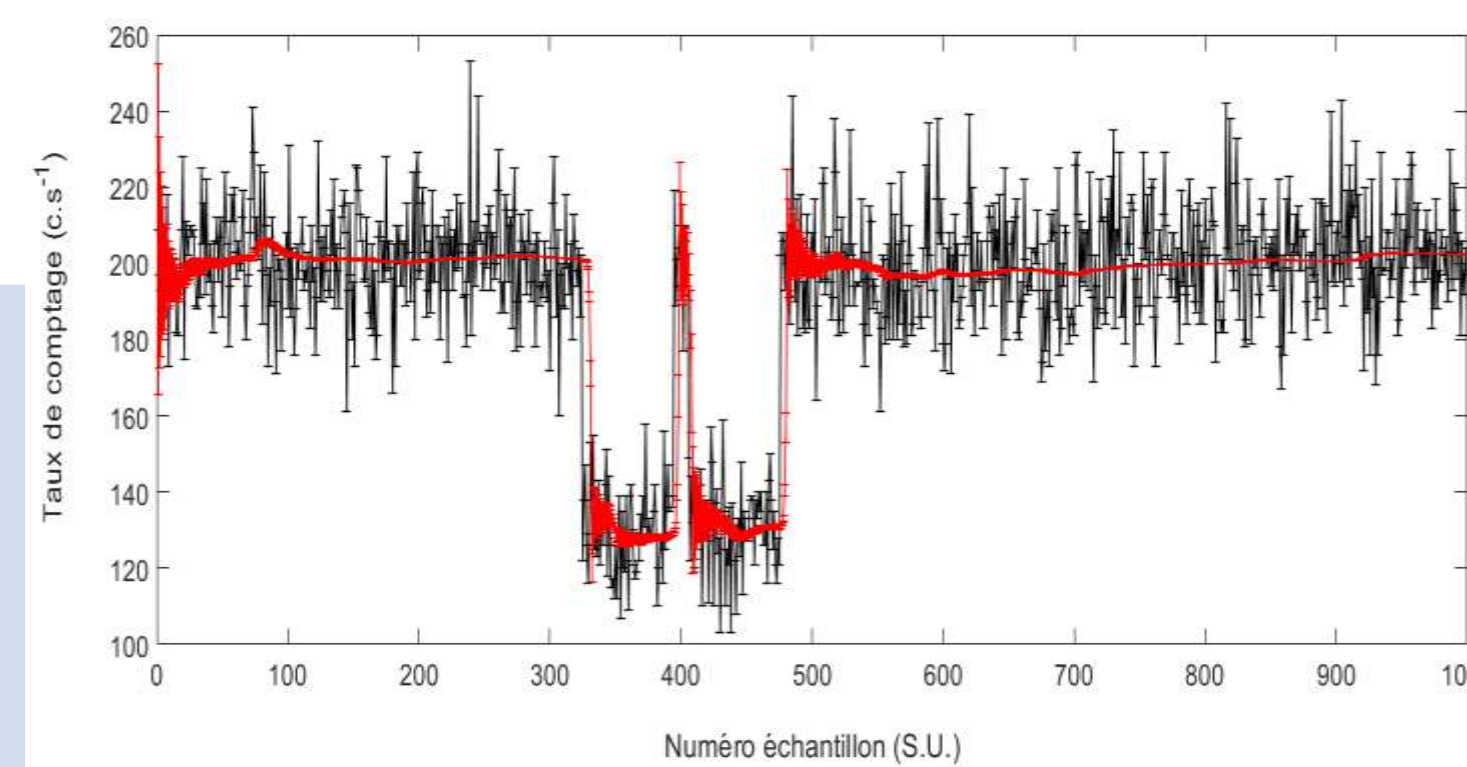
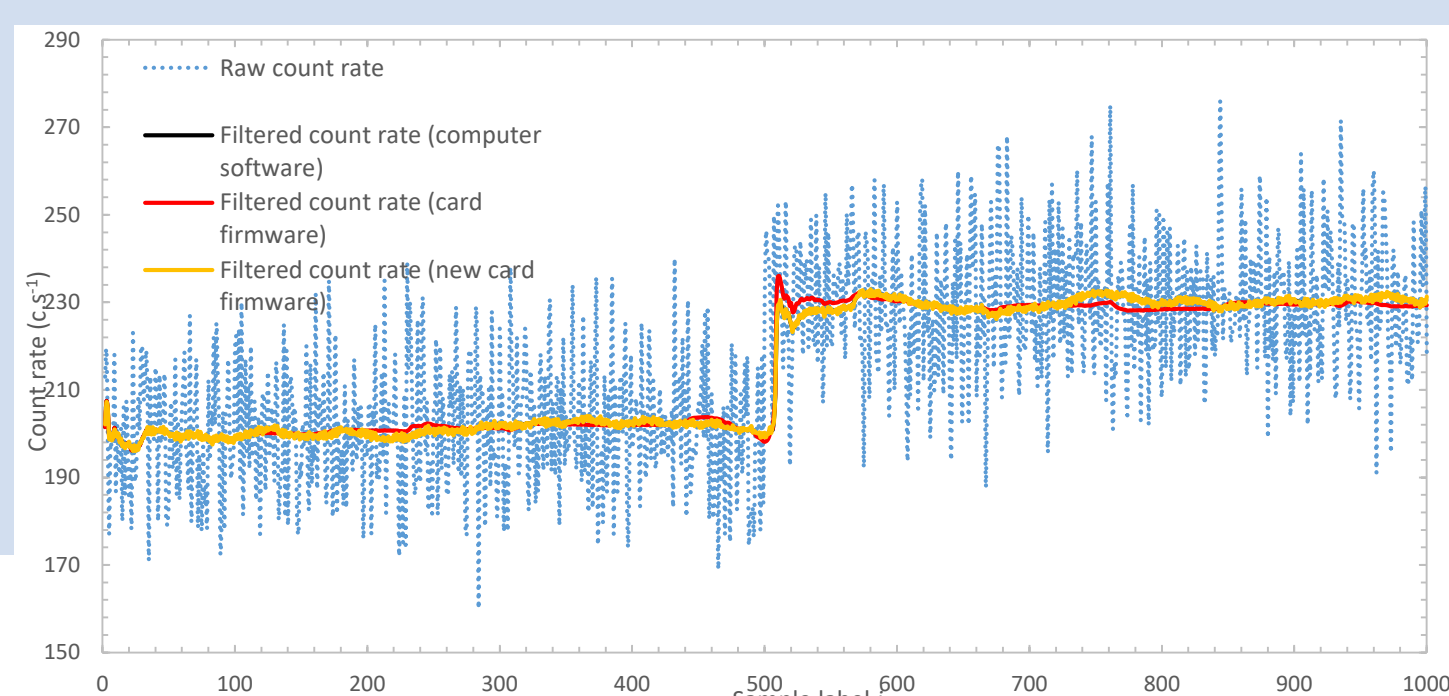
Problem description:

Abrupt variations, noise and screen effects have a major impact on the measurement of count rates inducing false alarms. In order to limit them, we propose to use signal processing algorithms.



Approach:

Smoothing

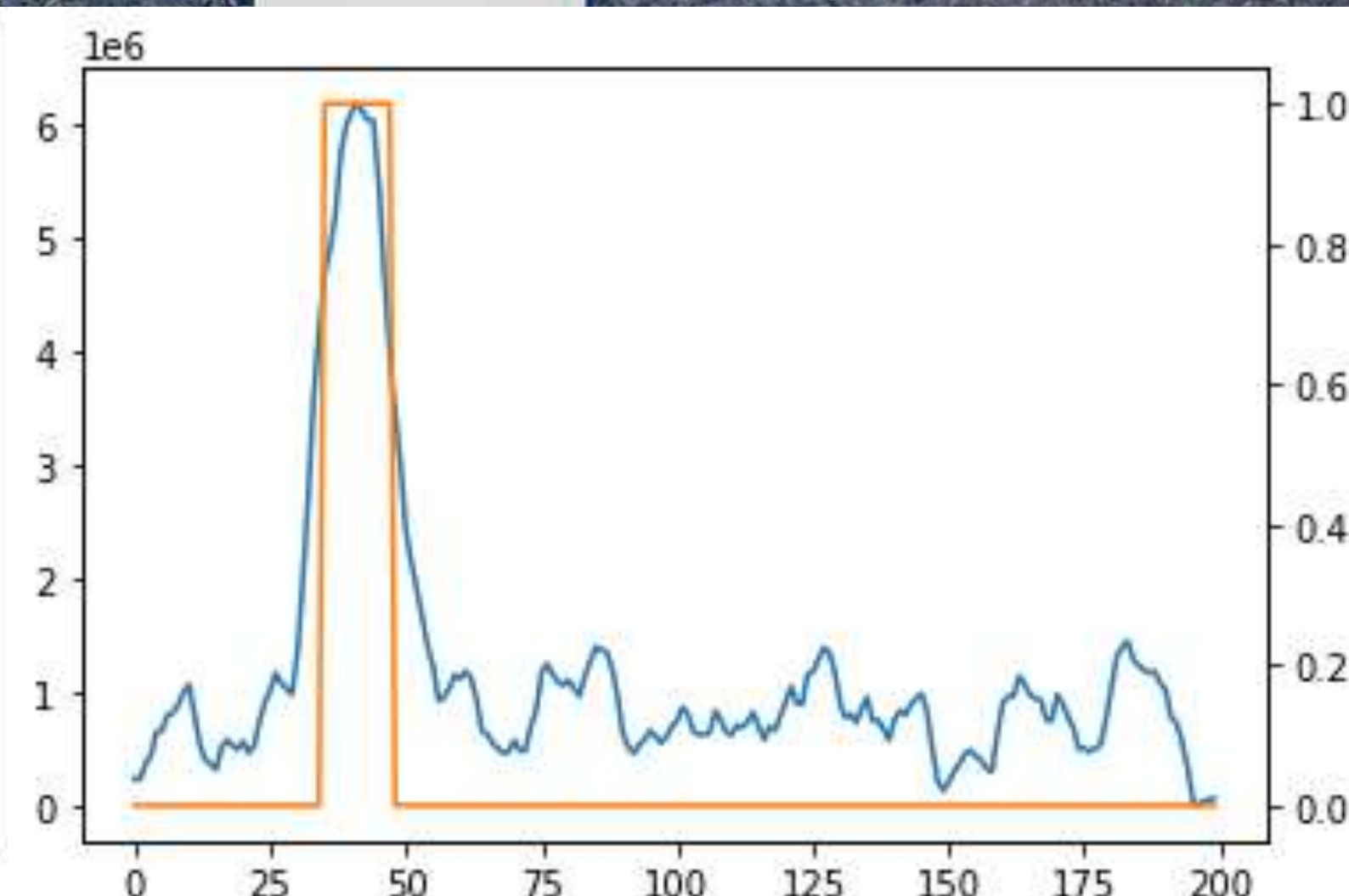
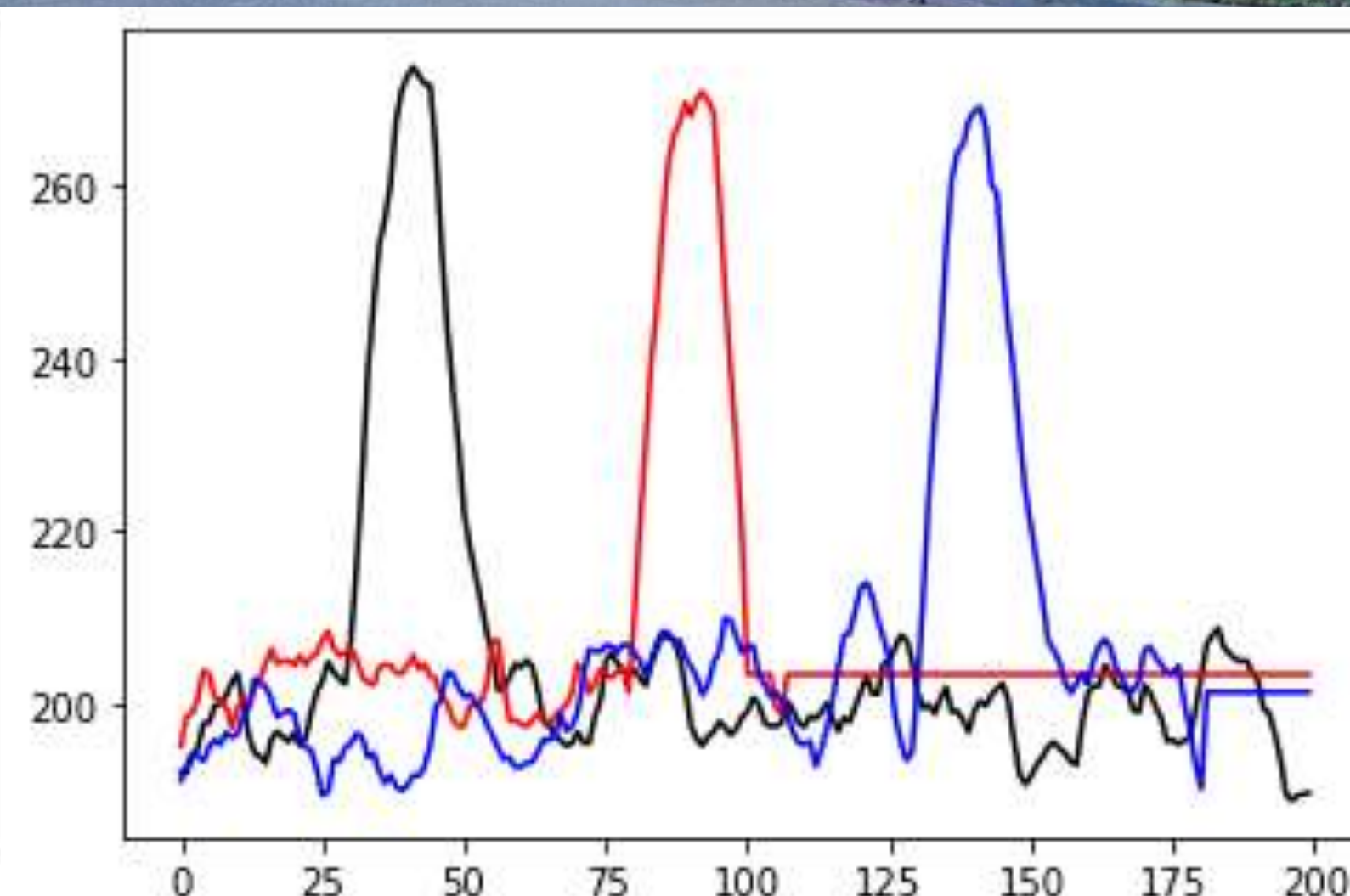
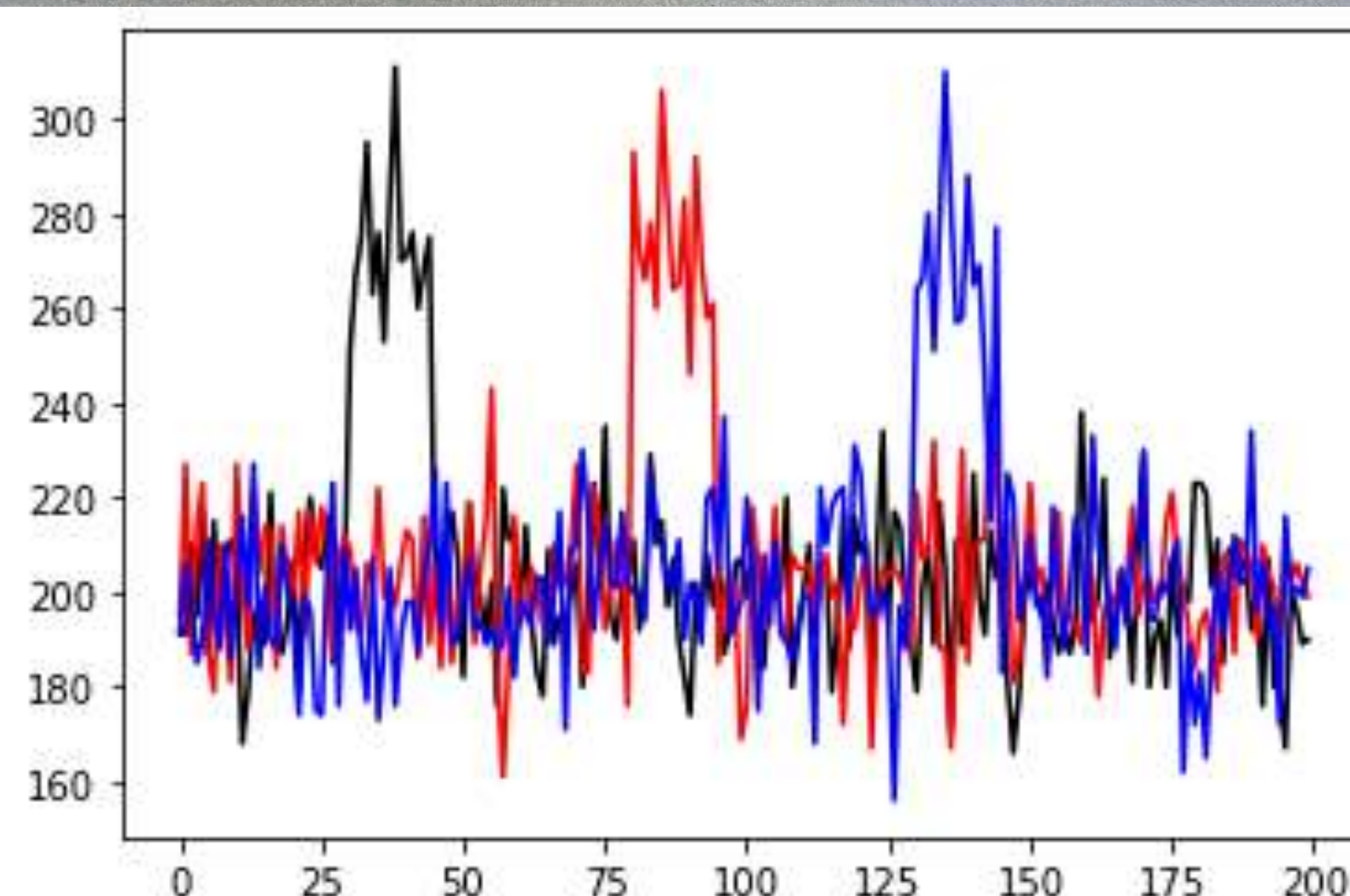


Shadow effect compensation

Time correlation

$$C_{sr}(n) = \sum_{m=0}^{N-1} s(m)r(m-n) \text{ with } n \in [0, M+N-1]$$

First Results:



The correlation increases the Signal to Noise Ratio for the count rate that allows us to improve the detection limit, detect radioactive source with lower activity, or to increase the speed of source passage for a given activity. The results are in progress to determine the limits for speed of passage.

Next steps:

Continuation of the integration work on the Saphygate G system architecture in partnership with BERTIN Technologies

Performance evaluation at JRC, Ispra, Italy in the second half of 2022



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