Short pulse processing in TES detectors (study case for Athena/X-IFU)

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Abstract. The X-ray Observatory Athena is the mission selected by ESA to implement the science theme "The Hot and Energetic Universe" for L2 (the second Large-class mission in ESA's Cosmic Vision science programme). One of the two X-ray detectors designed to be onboard Athena is X-IFU (X-ray Integral Field Unit), a cryogenic microcalorimeter based on Transition Edge Sensor (TES) technology that will provide spatially resolved high-resolution spectroscopy. X-IFU will be developed by an international consortium led by IRAP (PI), SRON (co-PI) and IAPS/INAF (co-PI) and involving ESA Member States, Japan, and the United States.

X-ray photons absorbed by X-IFU detector generate intensity pulses that must be detected and reconstructed on-board to recover their energy, position and arrival time. The software prototype package (SIRENA) in development at IFCA/Spain contains a set of processing algorithms under study to get the best compromise between performance and availability of on-board computing resources.

We present here a comparison of different algorithms to reconstruct pulses shorter than those considered of high resolution, i.e. those where the full length is not available (having a close pulse after them) for their reconstruction under the baseline optimal filter algorithm. The objective of the study is to select the best algorithm based on energy resolution and computing performance results.