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## Application of the machine learning methods to the event classification in the J-PET scanner.

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One of the challenge for the total and large PET tomographs is the efficient selection of the true coincidence photon pairs and reduction of the background consisting of events with the photons scattered in the patient body, multiple scattered in the detector or coming from different annihilations (random coincidences). The J-PET scanner is the multi-layer, large field-of-view, cylindrical-shape PET tomography device made of plastic scintillators. Photons which are measured interacts in plastic scintillators dominantly by the Compton effect which makes the selection process even more challenging. We investigate the possibility of using the Machine Learning algorithms for multi-photon event classification to increase the signal to background ratio. Two boosted-decision trees algorithms: AdaBoost and XGBoost was used. The studies are based on the Monte Carlo simulation of the IEC-NEMA phantom. Preliminary results are compared with the standard selection procedure.

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