Detecting elementary particles and observing accompanying events in particle colliders is one of the most important fields of current research in experimental physics. TimePix and its successor TimePix3 are types of the currently used detectors which are placed beside other in ATLAS experiment conducted by European Organization for Nuclear Research. Such detectors can produce huge amount of data about passing particles at high rate.

The goal of the thesis is to develop methods for detecting and classification of elementary particles observed by detector network ATLAS-TPX3. Suitable methods for clustering and/or classification based on semi-labelled data should be identified or new one should be developed. The proposed methods will be implemented and their performance on real data will be evaluated. The results will also include an implementation of framework for preprocessing low level data from detector network ATLAS-TPX3 in real-time and creating outputs that are suitable for subsequent physics investigation (e.g. ROOT framework files) including the proposed or future methods for particle classification.