

Project 3/2014: "**Development of a neural network track trigger for the Belle II experiment**"

Proposers: Y. Chen (TUM), C. Kiesling (MPP), A. Knoll (TUM), S. Neuhaus (TUM), S. Skambraks (TUM)

Abstract:

Triggering on individual charged particles is becoming more and more important in modern particle physics experiments for efficient background reduction. Studies for the Belle II detector using feed-forward artificial neural networks (Multi Layer Perceptrons, MLP) have shown that a significant part of the background can be rejected already at the first level trigger. The MLP uses the drift time information from the Central Drift Chamber (CDC) for a given track to estimate the z-vertex with a precision of 1 cm, which is a factor of 10 better than the conventional methods. Different MLPs need to be trained, each specialized for a given phase space element for the charged particle tracks. Owing to the neural algorithm, the network training should be highly parallelizable, making full use of a parallel computing architecture. The second highly parallel task is the generation of the required training events. Both these aspects warrant a detailed evaluation study using the C2PAP infrastructure.