

A tutorial for NA62Analysis: creating the VertexCDA and Pi0Reconstruction analyzers.

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This document will describe the process of creating the VertexCDA and Pi0Reconstruction analyzers within the NA62Analysis framework. It is intended to guide future analyzer authors by describing the complete procedure.

1 VertexCDA

The aim of this analyzer is to implement an algorithm that will compute the Kaon decay vertex and make it available to further analyzers. Though different methods are available for this purpose, the focus is given on a closest distance of approach (CDA) algorithm. The algorithm implemented by this analyzer can be used for the class of processes $K^\pm \rightarrow C^\pm + \dots$ where K^\pm is the incoming charged kaon measured in GigaTracker and C^\pm is a charged particle measured in the Spectrometer. Even if the tracks are supposed to originate from the same point they are in practice never intersecting because of the finite measurement precision. The CDA will find the unique point $v = (v_x, v_y, v_z)$ where $d(v, t_1)$ and $d(v, t_2)$, the distance between v and the first track t_1 and the distance between v and the second track t_2 respectively, are minimum.

1.1 Description of the CDA algorithm

Even if the GigaTracker and Spectrometer tracks are supposed to be part of a single event The closest distance of approach algorithm computes