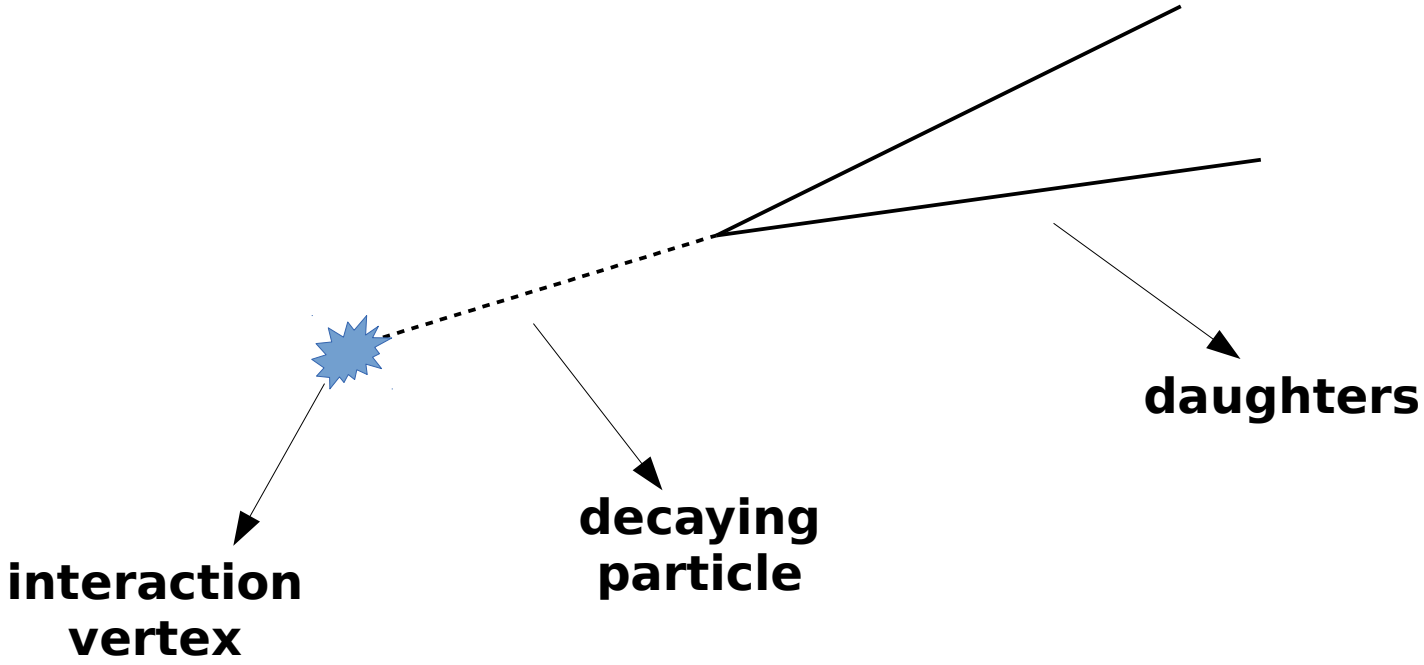
HighRR TFR Hands-On: decay reconstruction

Alessio Piucci

2 June 2017
HighRR TFR Hands-On

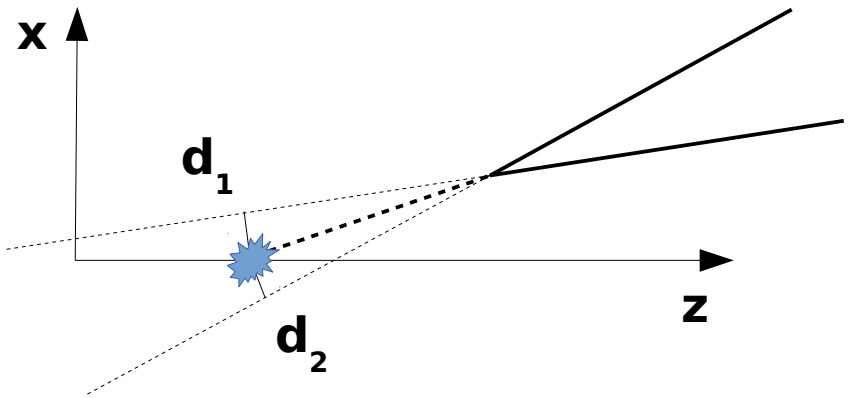
UNIVERSITÄT
HEIDELBERG
ZUKUNFT
SEIT 1386

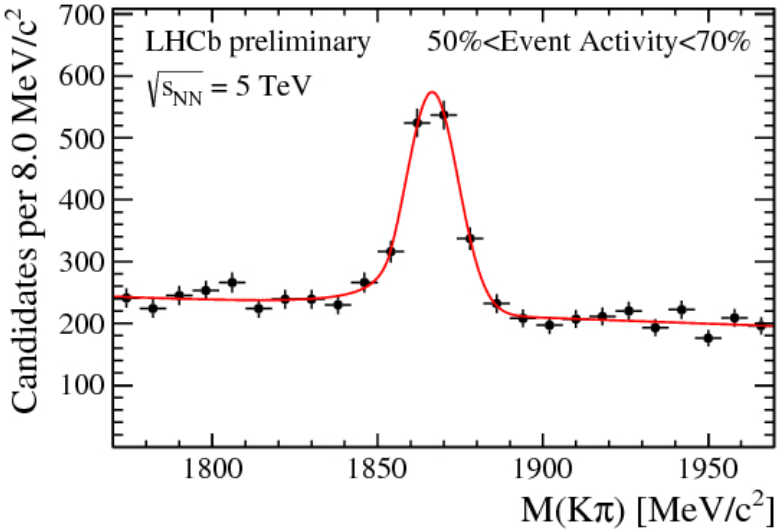
Decay of particles



Decay reconstruction

- essential discriminants to reconstruct decays/reject background (at heavy-flavour experiments):
  - impact parameter
  - invariant mass of the candidate





D^0 decay

- simulation of $D^0 \rightarrow K^+ \pi^-$ decay

- @LHC, D^0 flying for mm – cm (depends on its p)
  → measurable impact parameter of daughters!

- impact parameter: need vertex fitting

- invariant mass: need p measurement of daughters

Vertex fitting

More than a simple fit...

a) fit your tracks independently
b) constrain the tracks to come from the same space point
c) crazy constrained-fit

You can face it with Lagrange multiplicators
and iterative fit procedures (...Kalman...)

More infos in Wiki / Vertex fitting

Invariant mass

- let's simulate signal tracks only in the events:
→ you have everything you need!

TASK:

1) measure the momentum of the 2 particles
(complete the chain of rules in the runSim.sh)
2) combine the two particles,
computing the combined invariant mass
(call the reco_decay macro)

- you also need the mass of the particles
(K = 497.6 MeV/c^2, p = 139.6 MeV/c^2)
→ how do you set them?