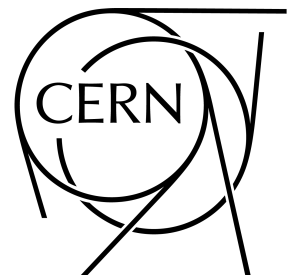


4D Tracking in ATLAS

4D Tracking Meeting, 13th April 2022



Valentina & Ariel

SLAC

Recap

- Recap from our previous discussion in January:
<https://indico.slac.stanford.edu/event/7061/>
- Next steps:
 - check impact on **tracking** → **b-tagging** → direct connection to **physics cases**
 - **Work has started!**
 - Produce **ATLAS samples** (ITk+HGTD scenario) containing **tracks decorated with time information**
 - <https://twiki.cern.ch/twiki/bin/viewauth/AtlasProtected/4DPreliminaryInvestigation>

4DPreliminaryInvestigation

- ↓ [Introduction](#)
- ↓ [Instructions for rel. 21.9](#)
- ↓ [Presentations](#)

Introduction

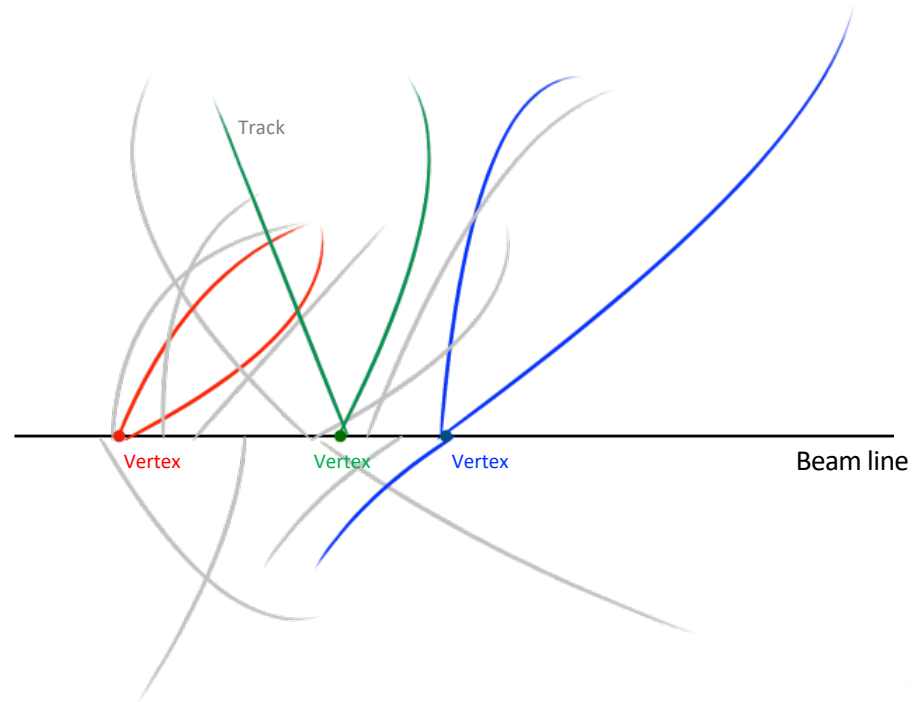
This page will collect studies (and the related technical information) about the 4D tracking investigation for a potential ITk upgrade to complement the functionalities of the HGTD. If you have questions, please contact valentina.maria.cairo@cern.ch and ariel.schwartzman@cern.ch.

Not yet
Certified as
ATLAS
Documentation

Responsible:
[ValentinaCairo](#), [ArielSchwartzman](#)

Ongoing work

- Truth based studies



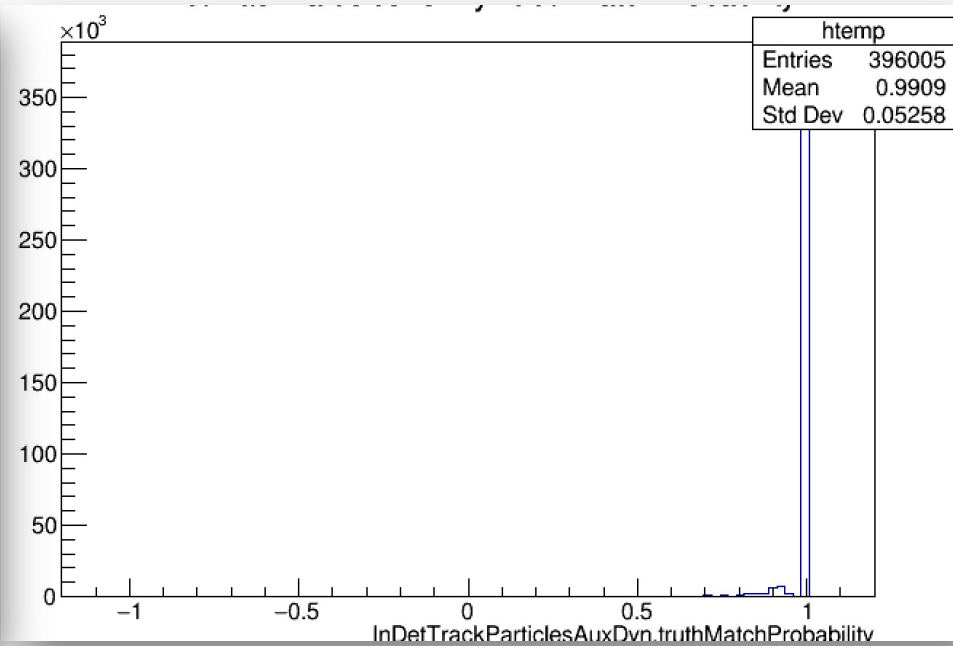
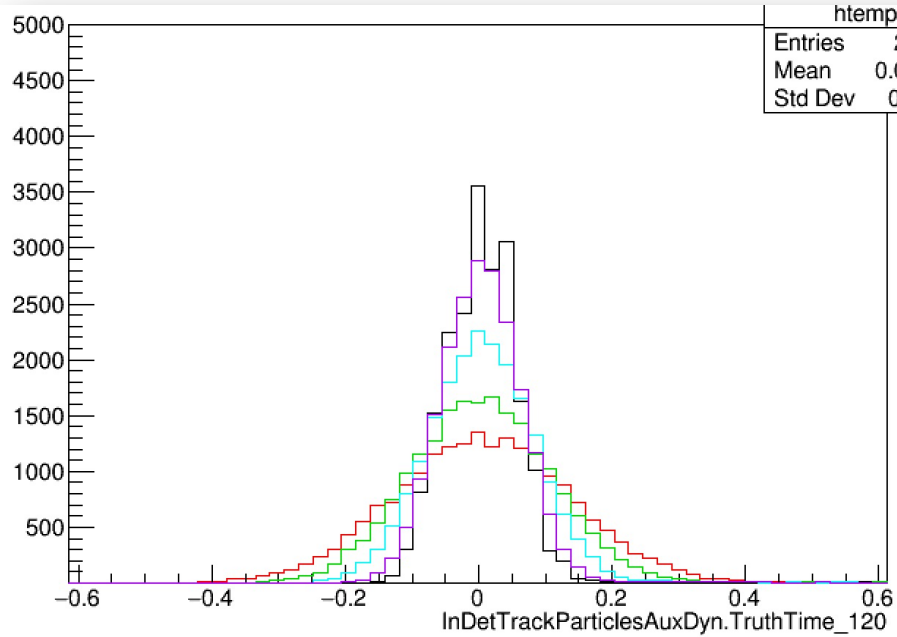
- Track → truth particle (**primary** and stable) → truth vertex --> time
- Smear by XX ps and associate vertex time to track
- TruthMatchingProbability added
- Next step:
 - Include mis-association
 - Create ntuple to allow for easier downstream analysis (include track, vertex, jet info)

```
ITkTime=-1e3;  
ITkTime_30=-1e3;  
ITkTime_60=-1e3;  
ITkTime_90=-1e3;  
ITkTime_120=-1e3;  
ITkTime_180=-1e3;
```

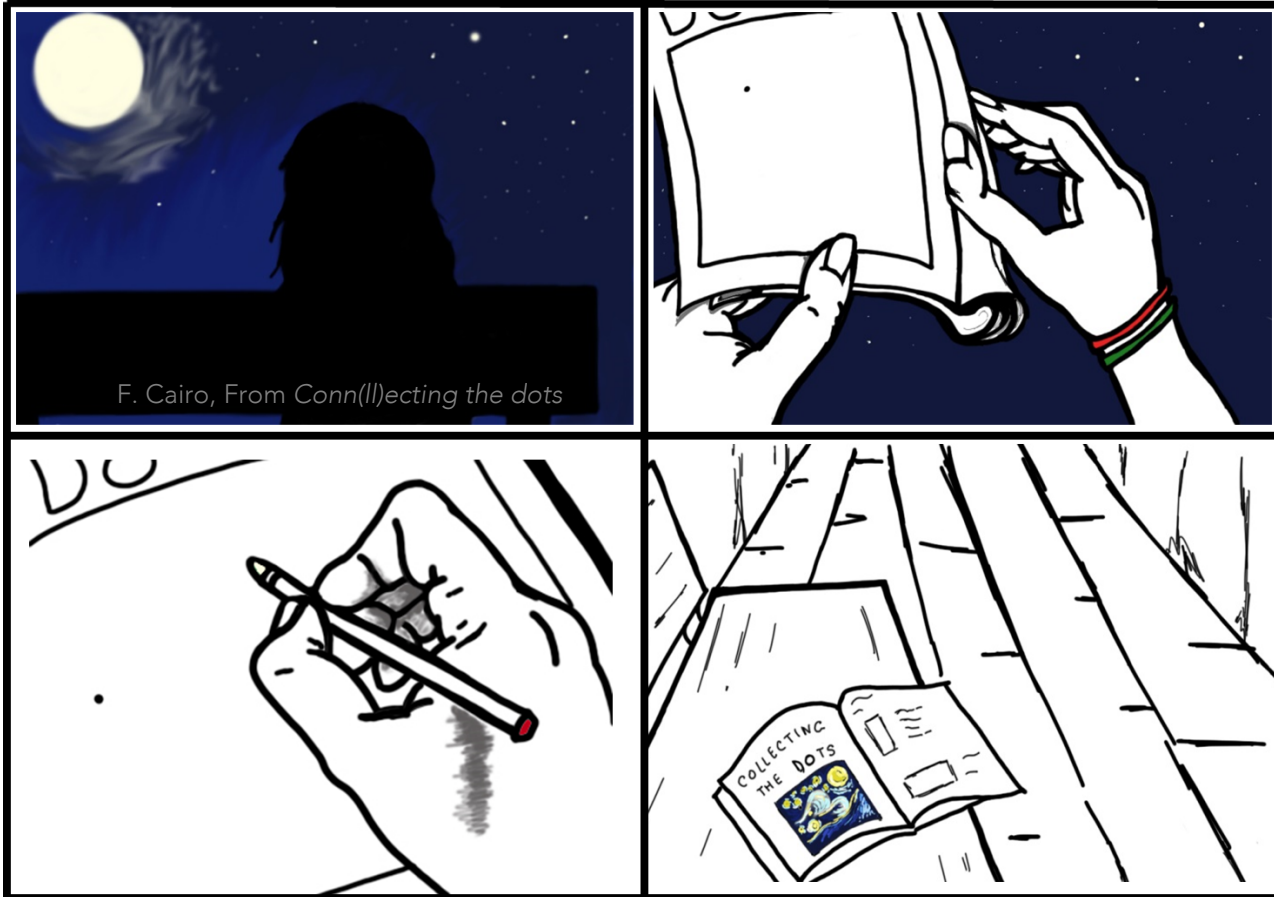
Ongoing work

$$P_{\text{match}} = \frac{2N_{\text{common}}^{\text{pix}} + N_{\text{common}}^{\text{strip}}}{2N_{\text{track}}^{\text{pix}} + N_{\text{track}}^{\text{strip}}}$$

L. Santi



Thanks for your attention!



F. Cairo, From *Conn(II)ecting the dots*

Valentina Maria Martina Cairo



V. M. M. Cairo