# Report from the alignment working session

▷ Summary of the things done and to the things to do by all detectors in order to establish a common alignment framework.

◇ according to the presentations given during this week;

◇ please add items to or correct the list if needed

▷ Brief recall to the steps we intend to be commonly finished very soon.
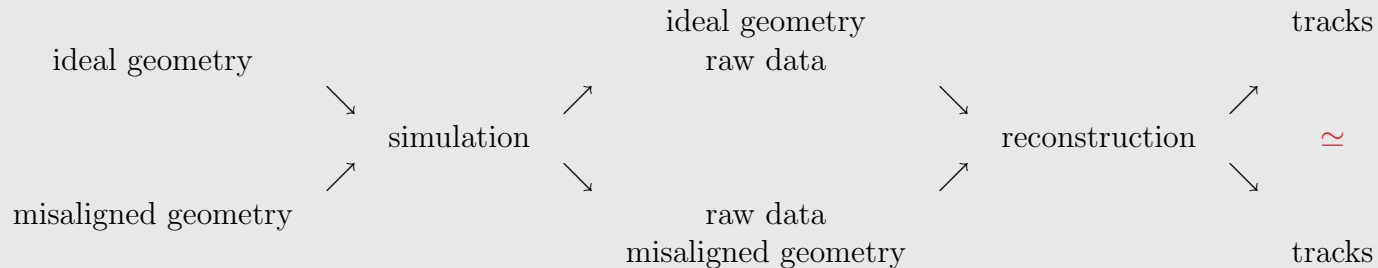
Alignment steps for each detector

Quoting Federico's outline:

1 define alignment objects; upload them into the geometry to

2 run test 1 (to see if simulation is alignment-aware):
   simulation (same generation, e.g. same random seed) with ideal
   and misaligned geometry has to give different "points"

ideal geometry   digits/raw data

                                simulation $\neq$

misaligned geometry   digits/raw data
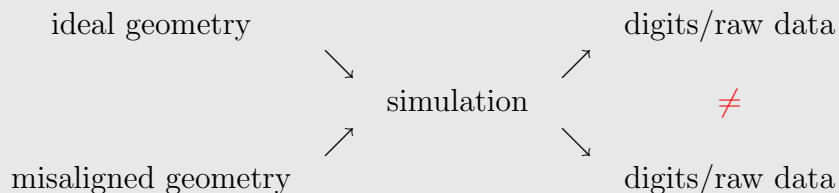
3 run <mark>test 2</mark> (to see if also reconstruction is alignment-aware) :

$$\text{ideal geometry} \searrow \quad \nearrow \quad \begin{matrix}\text{ideal geometry}\\\text{raw data}\end{matrix} \searrow \quad \nearrow \quad \text{tracks}$$

simulation   reconstruction $\simeq$

$$\text{misaligned geometry} \nearrow \quad \searrow \quad \begin{matrix}\text{raw data}\\\text{misaligned geometry}\end{matrix} \quad \nearrow \quad \searrow \quad \text{tracks}$$

· I.e.: if both simulation and reconstruction take correctly the misaligned geometry into account, the final result has to be statistically the same

· single tracks allow to check geometry volume by volume

Terminology: "misaligned geometry" is a geometry obtained from the ideal one by displacement of one or more volumes.

4 sensitivity study to alignment: how much do important physical parameters change w.r.t. given displacement?

5 alignment procedures with data within the detector

6 alignment procedures w.r.t. other detectors

· Step 1 is a prerequisite: the tools are those explained in this days, + a macro plugging alignment data from a `root`-file to `TGeo` (I will send you this macro in a few days and we'll put it very soon in the CVS-repository).

· There are open issues for the global framework, as seen, which anyway do not prevent to make any of the steps above but the last one.

State of the art for detectors (quoting detectors' presentations). w.r.t.:

- alignable volumes and alignment objects

- procedure to convert survay data into alignment objects

- testing with aligned geometry

MUON:

  · have been pioneering the alignment

  · mature alignment framework ready to pass to `TGeo` (e.g. text files $\rightarrow$ queries to `TGeo` for the geometry parameters, use of `TGeoAssembly`)

  · alignment objects quite defined

  · alignable volumes $=$ detection elements

TPC:

- clear ideas on alignable parts
- planned to soon finalize the geometry using `TGeo`
- tests on the simulation in progress (Cvetan)
- calibration/alignment effects interwined
- revision of the AliTPCParam class
- development of alignment algorithms already started (Marian)

PMD:

- alignable volumes well defined
- alignment only from survey?
- alignment algorithms in preparation

PHOS:

- · alignment objects identified
- · alignment from survay only
- · ready alignment class
- · some modification in the geometry in the "to do" list

TRD:

- · alignment objects identified
- · practising misalignment

TOF:

- · alignment objects identified
- · precision of survay still not clear
- · alignment procedures to be developped in the "to do" list

CRT: missing presentation

ITS: · all geometry management through class (`AliITSgeom`) and file ("*.det")
· development of alignment (managment of geometry obj. and alignment procedures) stand-alone up to now

FMD: · clear ideas on alignable parts and objects
· algorithm to turn survey points into a `TGeometry` already partially envisioned in AliFMDGeometry.

ZDC: not concerned by alignment

RICH: · alignable volumes known
· alignment objects to be defined
· testing with `TGeometry`