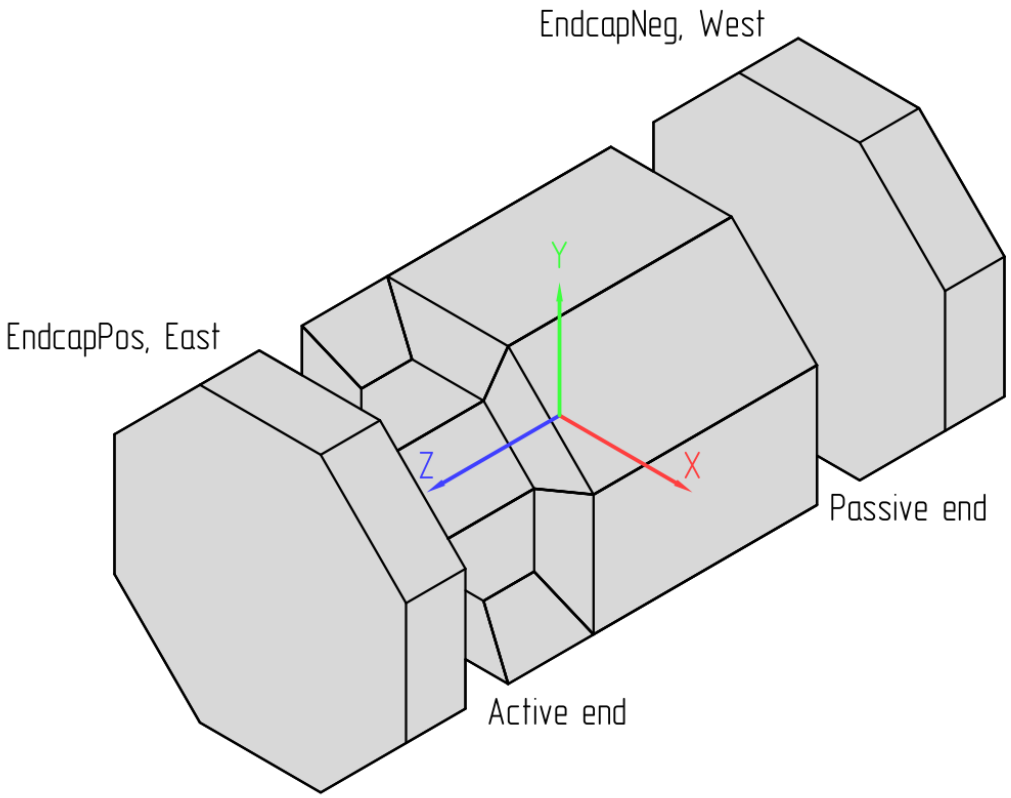
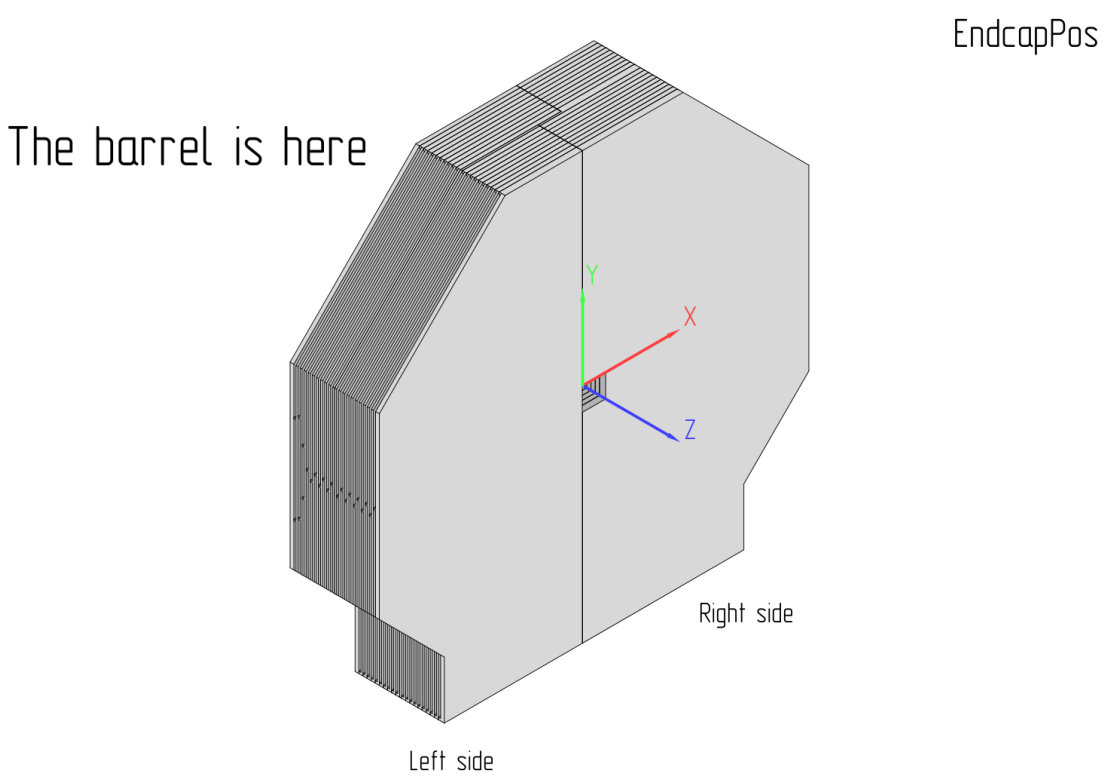
RS SIMULATION SOFTWARE CURRENT STATUS

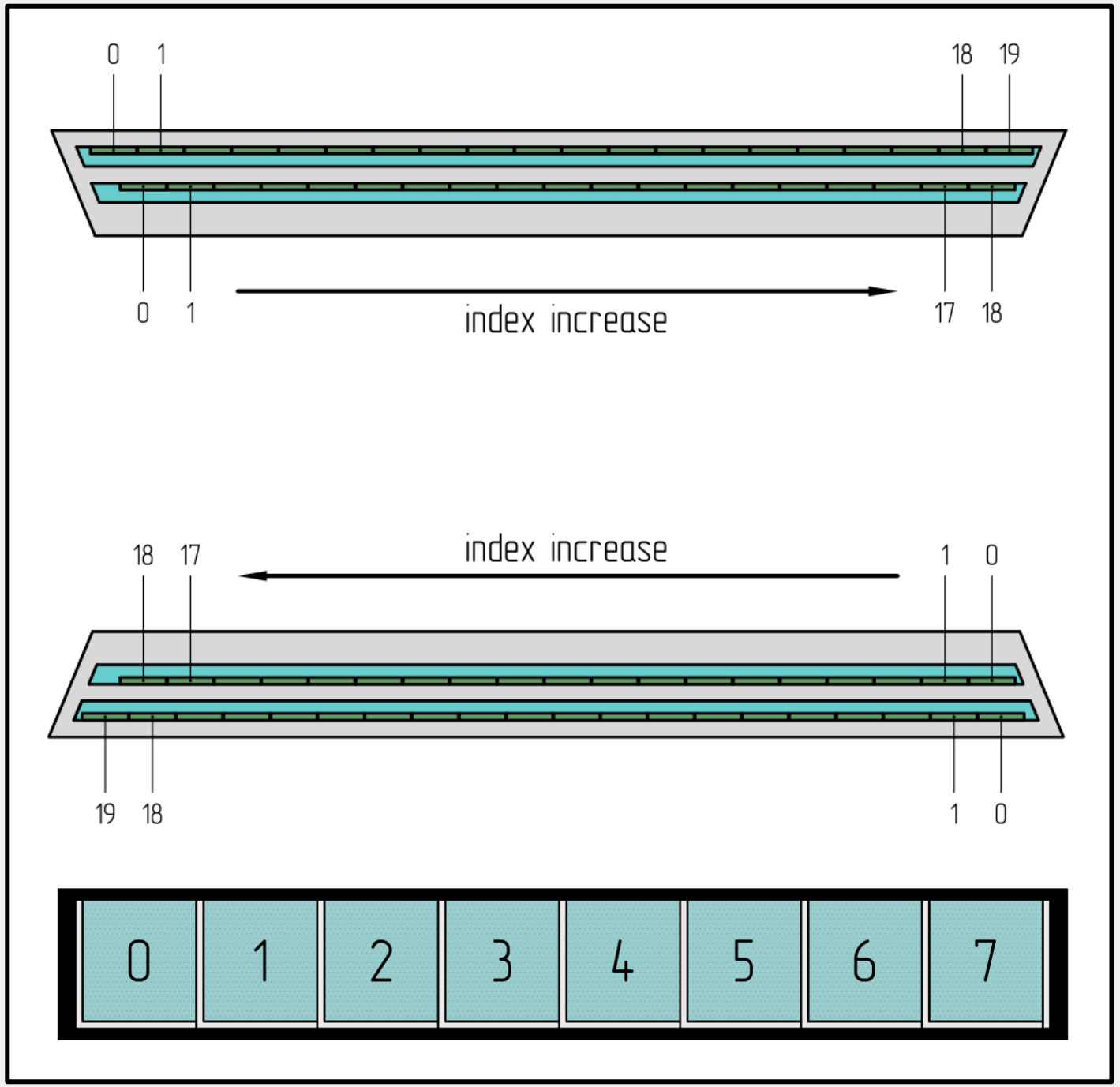
(06.10.2026)

Alexandr Osetrov

RS GEOMETRY

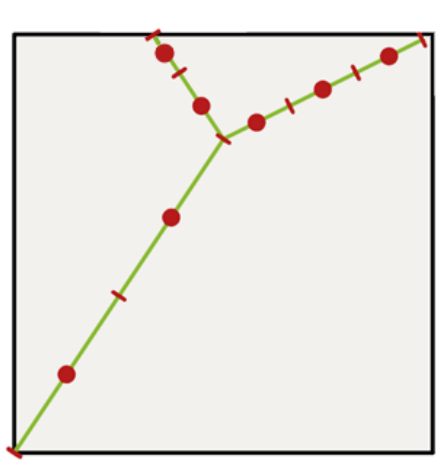

EndcapNeg, West
EndcapPos, East
Y
Z
X
Passive end
Active end


EndcapPos
The barrel is here
Y
X
Z
Right side
Left side


0
1
18
19
0
1
index increase
17
18
18
17
index increase
1
0
19
18
1
0
0
1
2
3
4
5
6
7

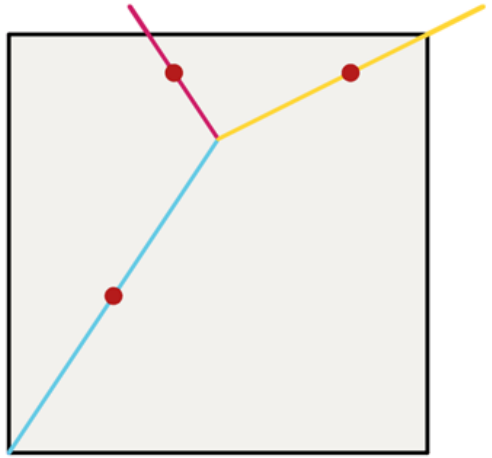
HITS PRODUCING

MCSteps



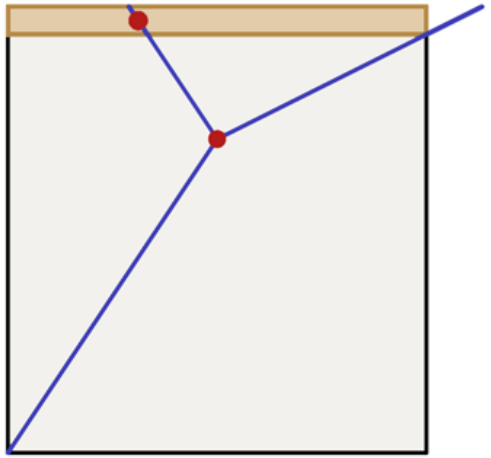
Several steps for each particle in one volume

RSMCHits



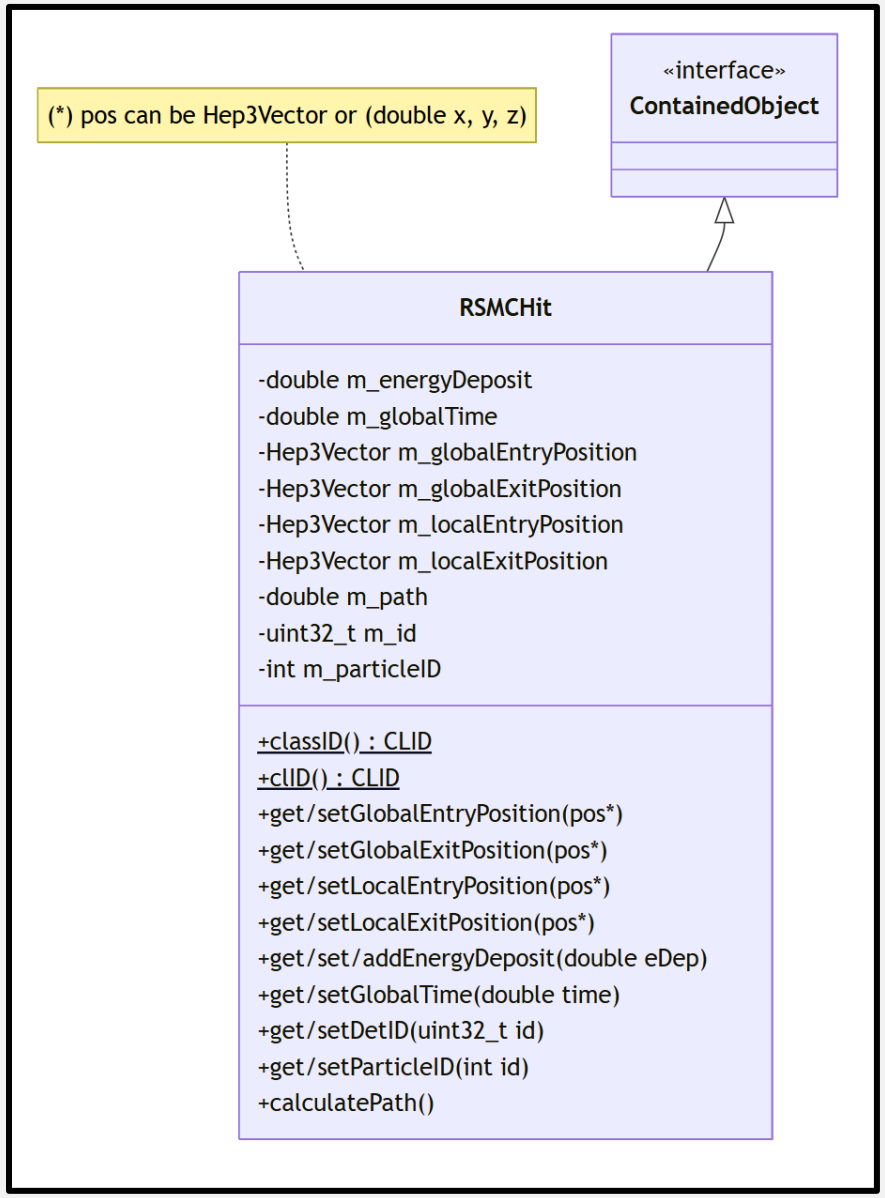
One hit for each particle in each volume

RSDigis



Only one digi per cell and one digi per strip

RSMCHit



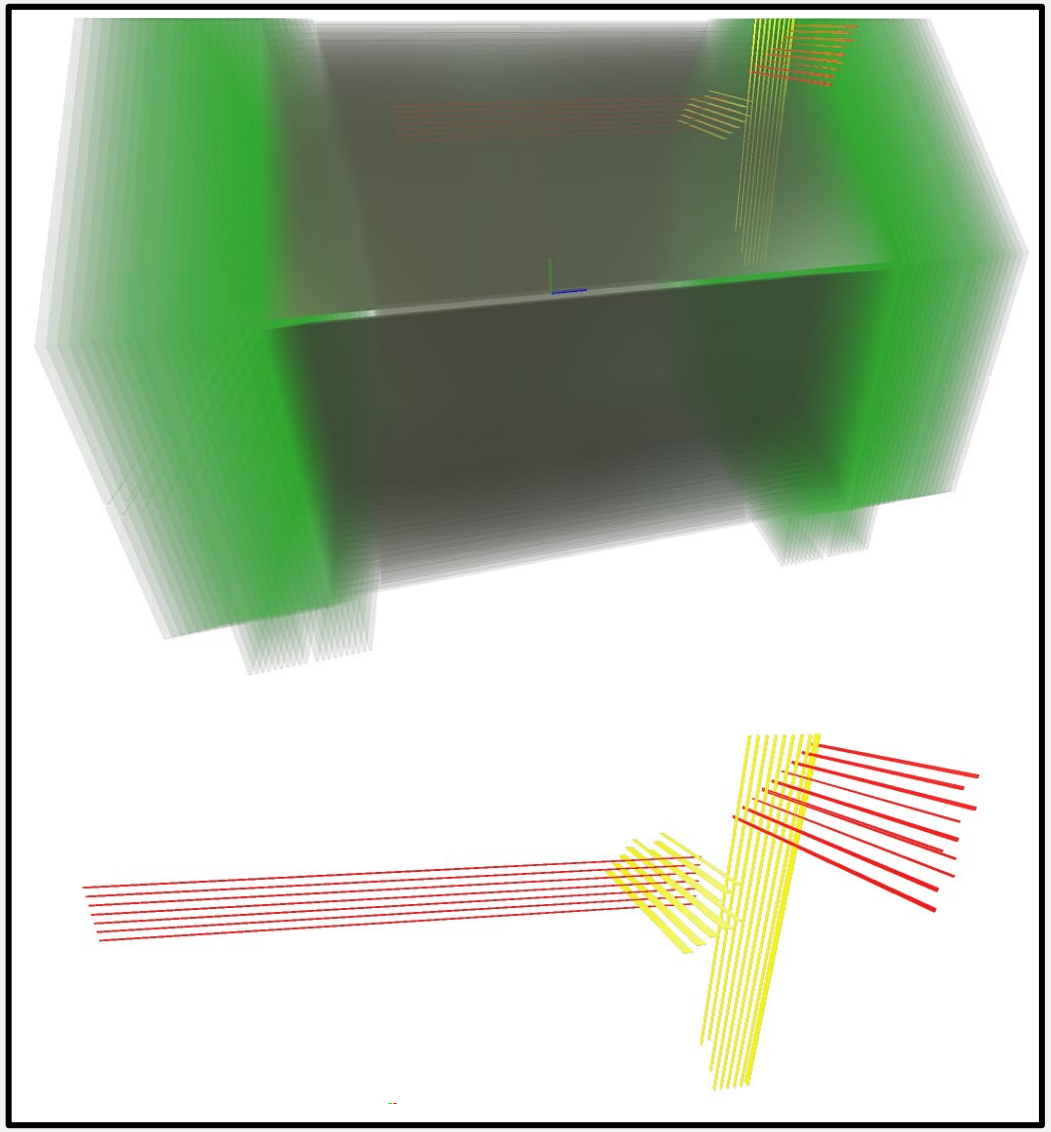
What is stored in the MC hit:

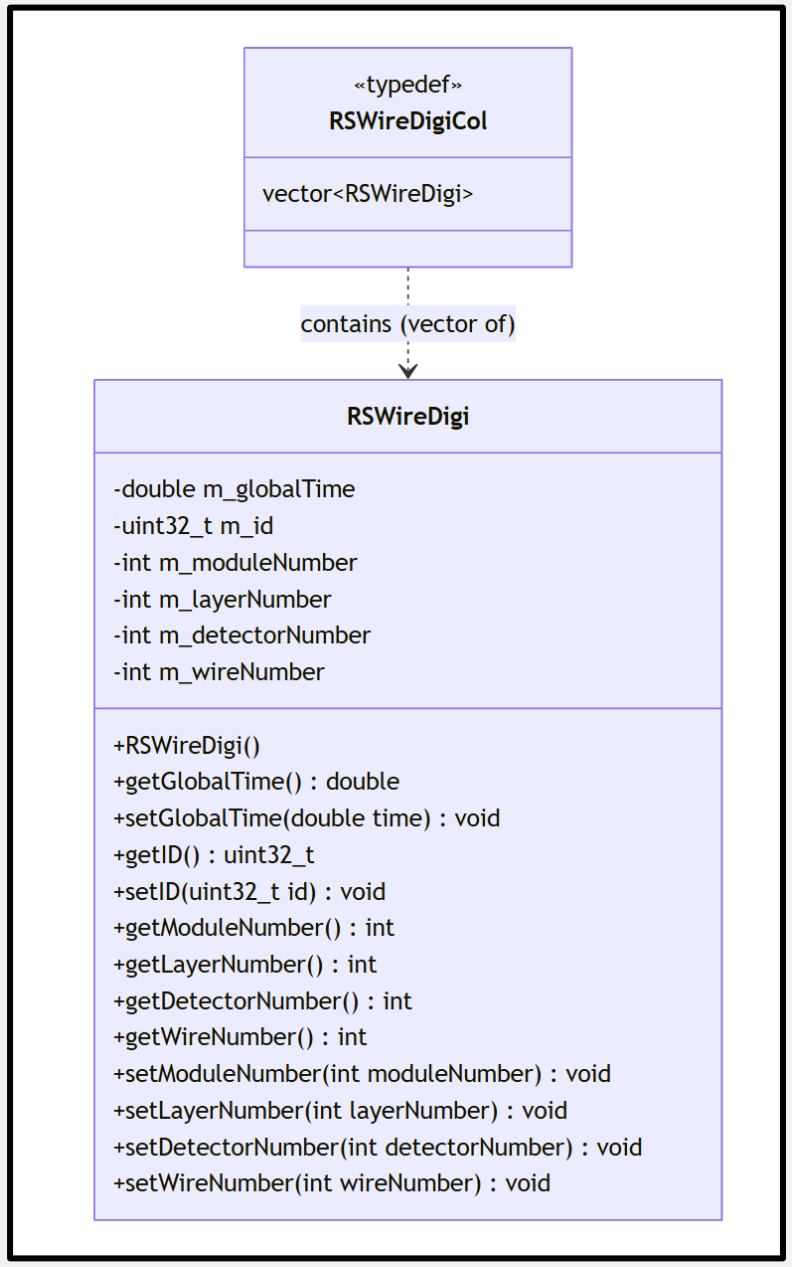
- Energy deposit
- Timestamp
- Global & local entry & exit positions
- Particle's path in a cell
- Unique & non-unique id

Digitalized hits (digis) simulate the real detector response in the experiment. They are divided into two types:

- **Wire digis**, shown in red in the figure, are responsible for triggered MDT detector cells and mark sensitive volumes.
- **Strip digis**, shown in yellow in the figure, are responsible for triggered strips, which, unlike cells, are not present in the geometric model as sensitive volumes.

RSDigis only indicate the fact of activation (strip/wire number & timestamp) in a specific area of the detector; they do not store information about the charge, energy deposit, or anything else.

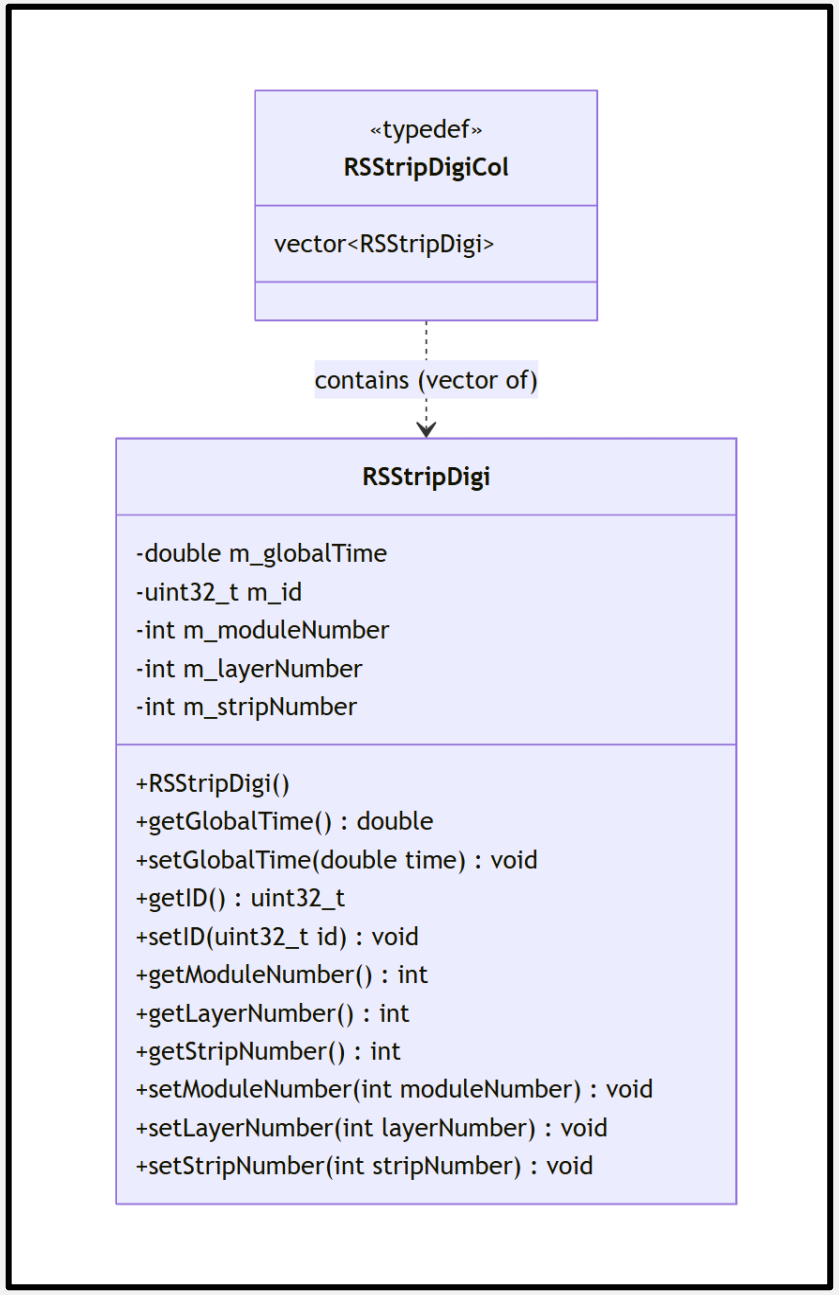




RSWireDigi

What is stored in the **wire** digi:

- 32-bit id indicating the position of the wire (cell) in the hierarchy of detector volumes
- The number of each volume in the geometric hierarchy of the system
- Timestamp



RSStripDigi

What is stored in the **strip** digi:

- 32-bit id indicating the position of the wire (cell) in the hierarchy of detector volumes
- The number of each volume in the geometric hierarchy of the system. Note that, unlike wire digi, the detector number is not stored here, since the strips are located above them.
- Timestamp

RSDigi FORMING

Currently, the empirical criteria for the "triggering" of the wire and strip are not definitive and require further refinement. The elements are activated according to the following principle:

- For a cell (wire) to be considered triggered, it must exceed a threshold of 0.2 keV energy deposit and a threshold of 2 mm for the particle's path within the cell. A detector dead time of 350 ns is also taken into account.
- A mandatory condition for the strip to be triggered is the firing of the cell beneath it, meaning the strip digi cannot appear "separated" from the wire. It is possible for multiple strips to fire above a single wire, depending on the distribution of the induced charge on the wire.

The criteria for digi formation will be refined once data from the range system prototype becomes available.

CURRENT DIRECTION OF THE WORK

- To develop RSRecoHits (in progress).
- To develop and integrate the DBSCAN clustering algorithm into Sampo.