

How to label the LAD bars (proposal)

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This document just pretend to be a proposal of how to label the LAD bars in an unique way and easy to code.

First we need to establish a common name to each part of the LAD detector. This is the first item to discuss, names. Until now, I've been using the following nomenclature. For LAD we have:

- 3 walls
- each wall has 2 subwall (except the third)
- each subwall has 11 paddles.

This is represented in the Geant4 simulation shown in the figure 1

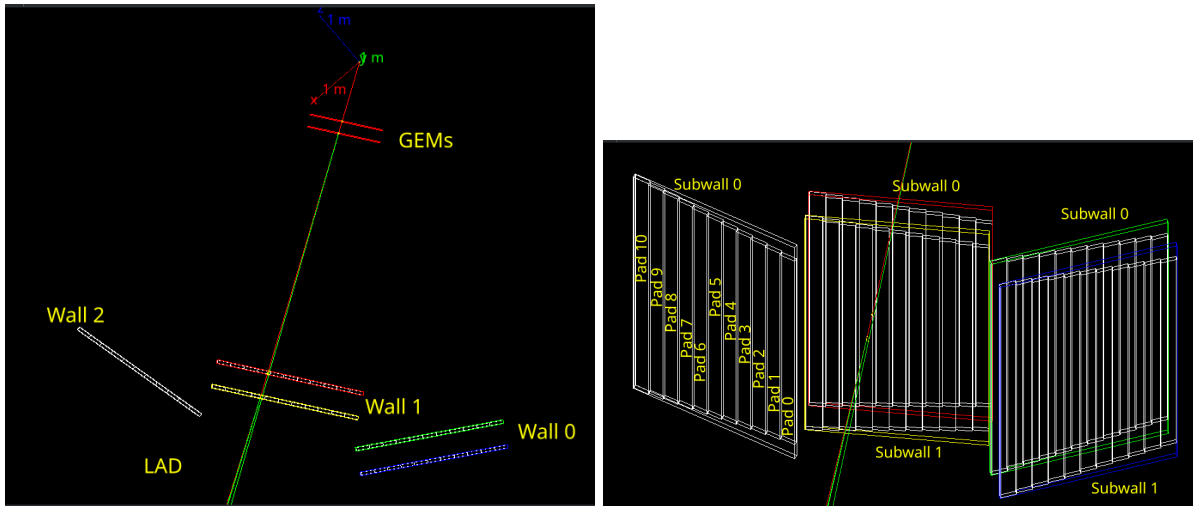


Figure 1: Geant4 screenshot captures of the LAD system, showing the different elements and its numeration

The idea suggested has two parts, the numbering and the orientation to number them.

In the simulation (first part of this proposal), the direction of the numbering goes, looking from top (fig. 1), from right to left (clockwise in the hall), and from near to far from the target.

To identify uniquely each paddle, the simulation uses the following system. A set of five digits as:

$$\begin{aligned} WSSPP \\ W : \text{wall } \{0-2\} \\ SS : \text{subwall } \{0,1\} \\ PP : \text{paddle } \{0-10\} \end{aligned}$$

But, computers cannot carry 0's to the left of significant digits, thus, in-code, not all the paddles will carry this structure. Example of numeration is shown in figure 2. The paddle colored green is in the Wall 0, subwall 0 and is the paddle 1, so its label is 00001 (computer, just 1). The blue one, is Wall 0. subwall 1, paddle 5, 00105 (105). Similarly, the yellow, 10107, and the white, 20001.

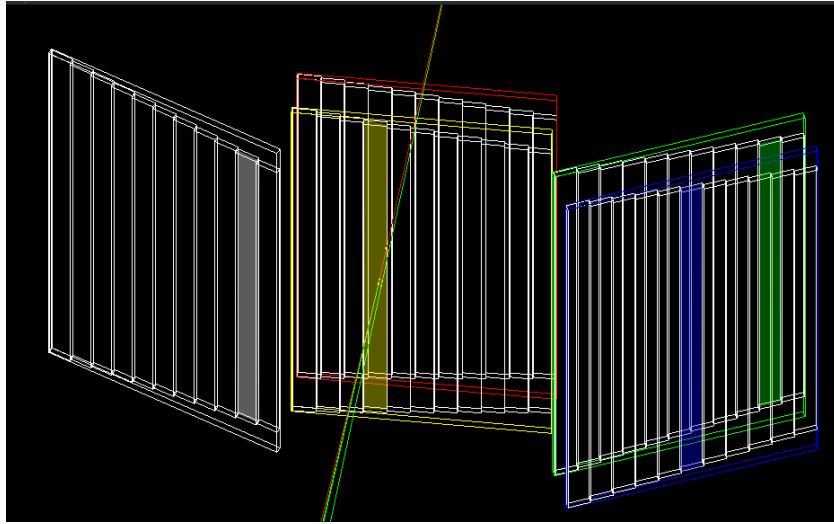


Figure 2: Colored paddles to exemplify the numeration

Certainly, the code could be reduced to 4 digits, since the subwalls are 0 or 1. I would prefer a 6 (5) digits set, to facilitate the lecture of the number in the cables, and the identification of the paddle. Just need to group two digits to search the paddle.

In the simulation, the paddle ID using this procedure¹, will be correlated to the information stored for such paddle. The code to recover the separate information of each element, which could be useful for future event displays, is as simple as this:

```
{
    int bar;    \\ WSSPP label
    int wall = bar/10000;
    int subwall = (bar - (wall*10000))/100;
    int paddle = ((bar - (wall*10000)) - (subwall*100));
}
```

In conclusion. This is just a document to open a discussion and to try to establish a common base about nomenclature, orientation of the elements, and labeling (for the cables and the software). It doesn't pretend to be final, just the beginning and open to discussion and feedback from everybody. Notice that in the whole discussion, the fact that each paddle has two photomultipliers is not included. For labeling purposes, U and D could be enough, but in software that won't be advisable. Maybe another two digits to the right must be necessary, something like WSSPPHH (HH 00 or 01 for up or down).

¹otherwise, a different method is discussed and approved