

HRS timing

by: Igor Korover

The trigger formation in the HRSs (as been presented by Vince during the collaboration meeting) is done in the following way:

The trigger (T3 or T1) is formed from coincidence between the **s1** and **s2m** planes in each HRS. The **s1/s2m** signal is **OR** between different paddles in the plane (Left side PMT && Right side PMT). Right side PMTs of the **s2m** plane are delayed by ~ 20 ns in respect of the left side, and the **s2m OR** is delayed by 20 – 30 ns in respect to **s1 OR**. This mean that the time should be carried by the right side of **s2m**. These delays should be in both HRSs, however, as been presented by Vince, the raw signals are delayed only in the left HRS.

This can be seen in the data taken for the current g2p experiment:

LHRS:

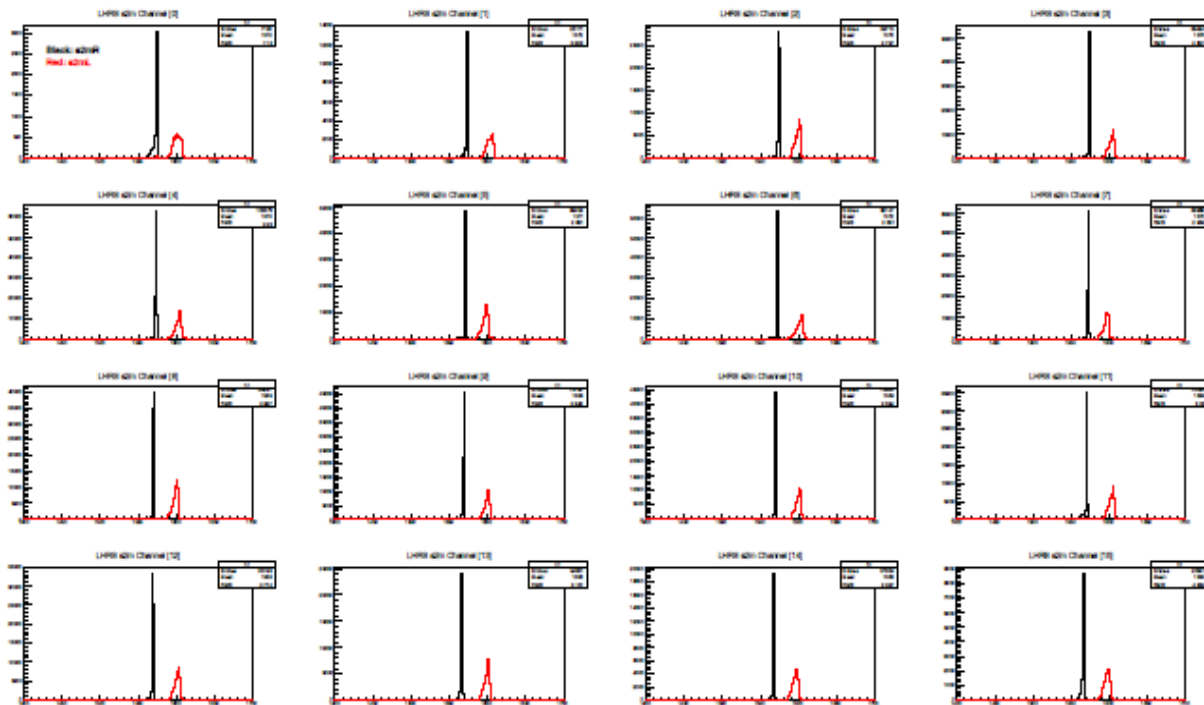


fig 1

RHRS:

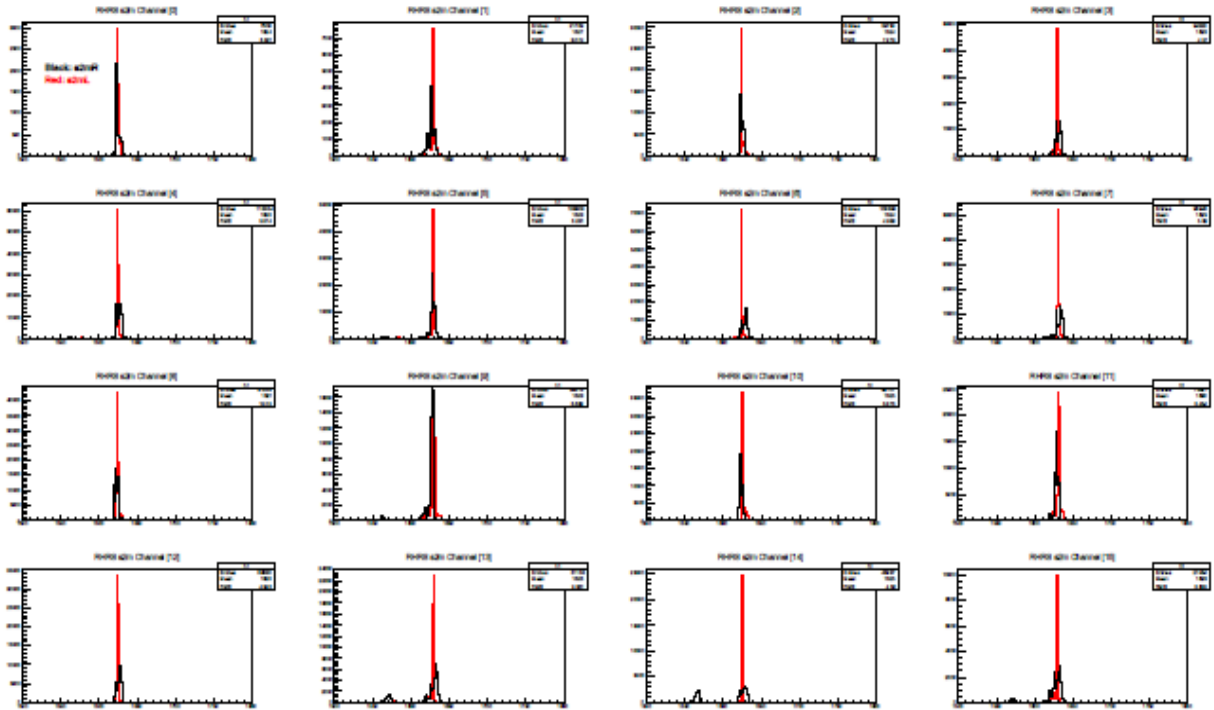


fig 2

The difference between current experiment and our data: **Retiming module.**

If we look on the electronic time of the T3 signal, it should be self timed. However, data showed:

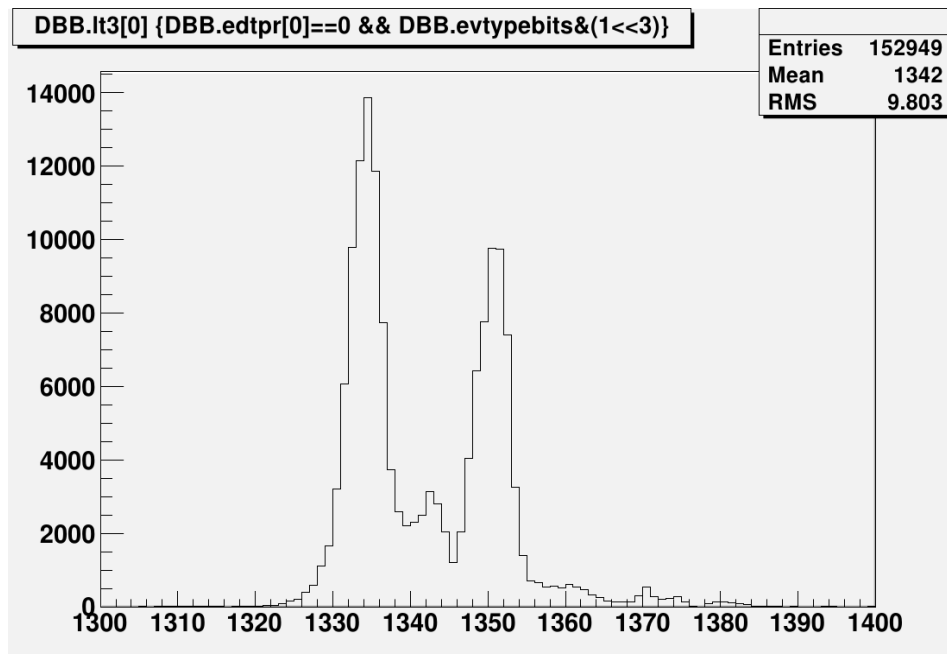


fig 3

This mean, that the problem is in the stop signal.

The stop signal is a retimed T3 signal.

Retiming is done from the strobe signal and the strobe signal is **OR** between **s1** and **s2m** planes.

However, the **s2m** signal is delayed in respect to **s1**. This means that the actual T3 signal is defined by **s2m** plane, but the stop for the electronic is defined by the **s1** plane.

The trigger configuration above won't allow us to see the self timing peak in the HRS.

In order to extract the real timing information from HRSs we must eliminate the dependence on **s1** signal:

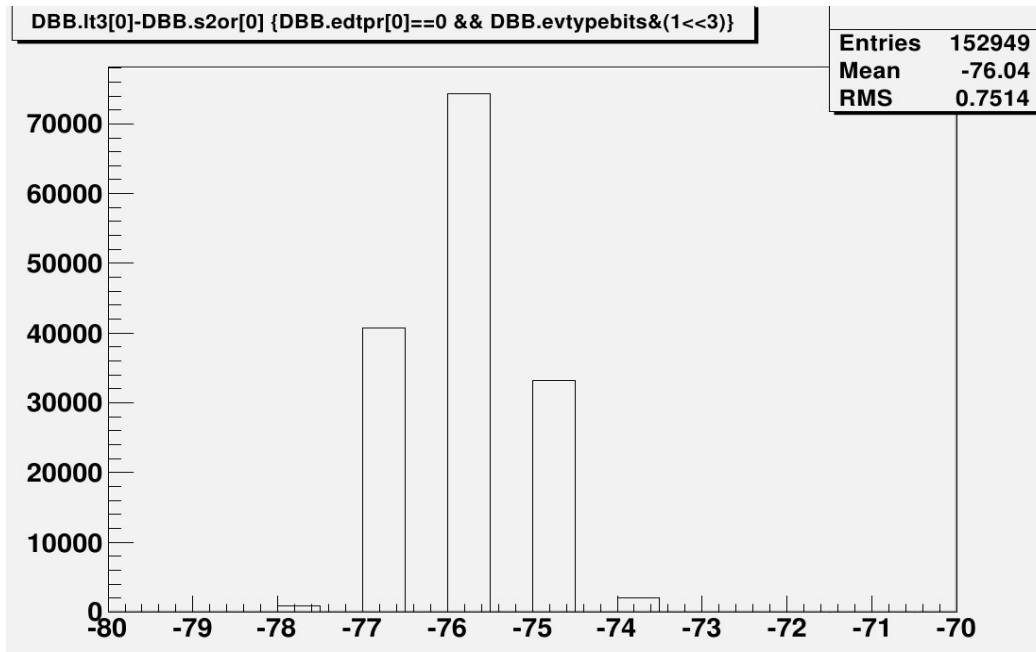


fig 4

If we look on TDC information from LHRS s2m plane:

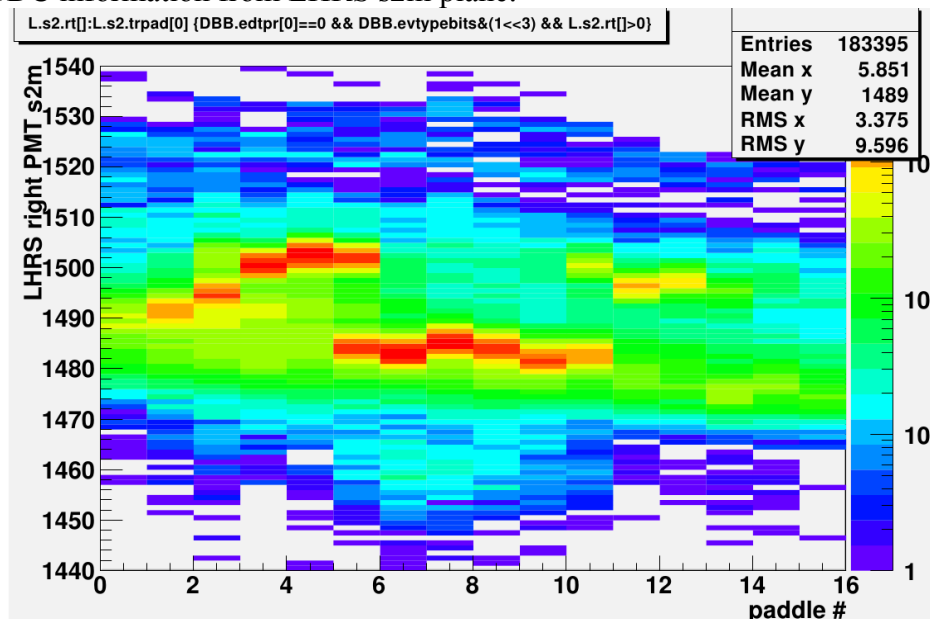


fig 5: before correction

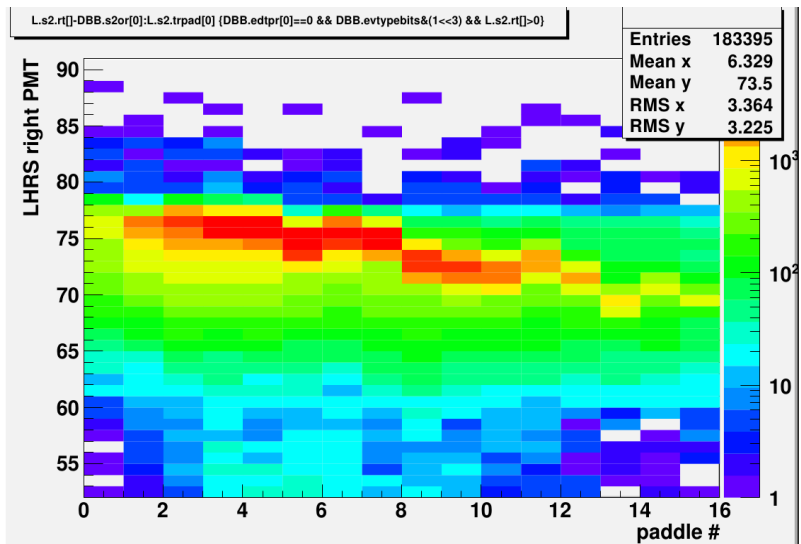


fig 6: after correction

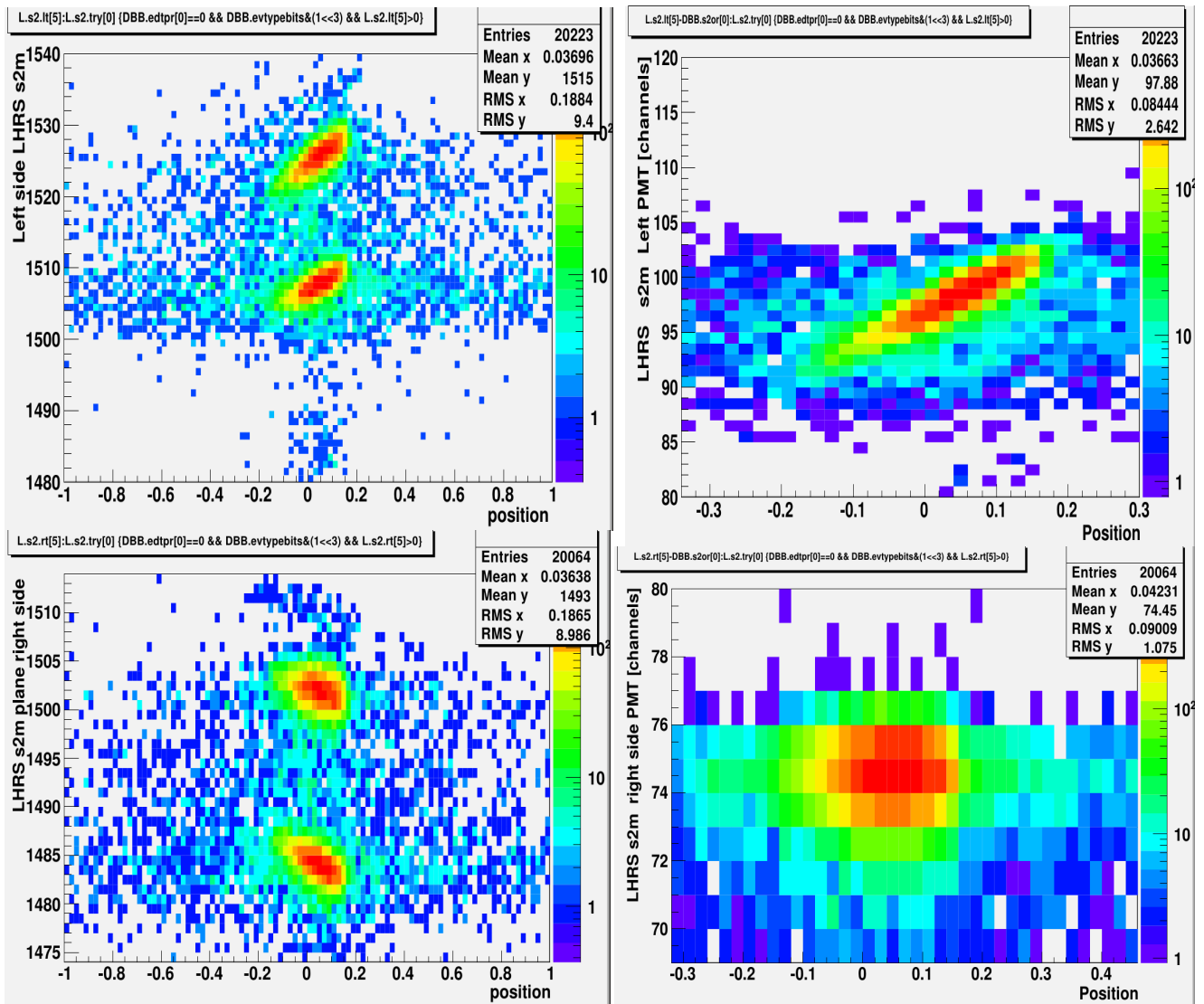


fig 7

After the correction, we can clearly see that the right side of s2m is carrying the time.

During the deuterium efficiency run, I saw a self timing peak in left HRS:

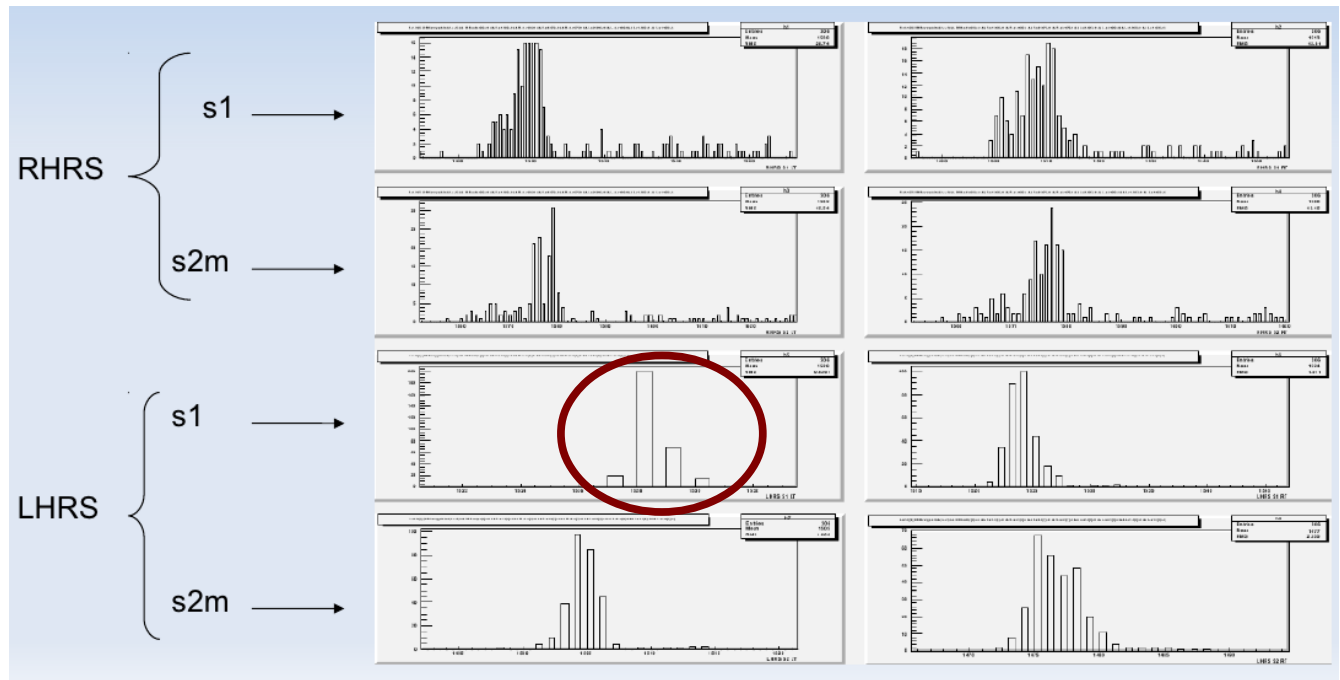


fig 8

The reason why we saw self timing peak is because the formation of T3 was without the **s2m** plane. This mean the retiming was done from the actual trigger. So we, didn't had any ambiguity in the stop signal.

HAND time walk Correction

Double check of the time walk correction with higher statistics.

Examples:

