

Status Report of 3D Tracker

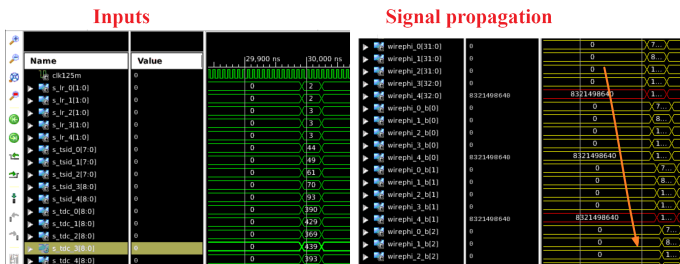
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ISIM test of 2D fitter

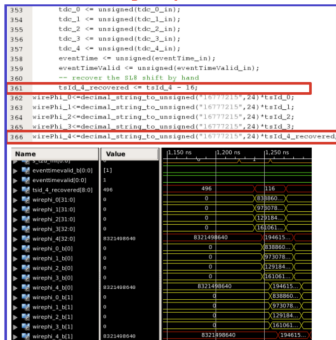
- 1. Test the performance of the 2D fitter with ISIM using phase 3 data.
- 2. One problem (unsynchronizd signals) and one bug (truncated signals) have been identified and then fixed after checking the status of signals clock by clock



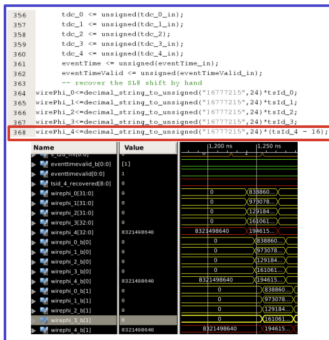
Problem of unsynchronizd signals

- 1. The signal of SL8 is not synchronized with others. It was delayed by one additional CLK compared with others.

Before fixing the problem



After fixing the problem



Problem of truncated signals

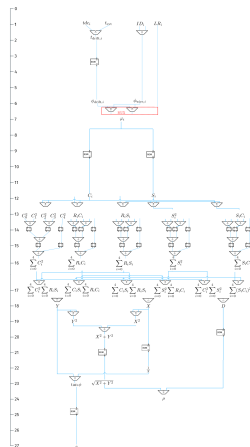
- 1. Some data are truncated after resizing.
- The integer signals in the program represent float numbers. Before sending the signal to Lut, the signal should be scaled and resized because the size of Lut is limited. However, some data are wrongly truncated because the bit size after resizing is too small.

```
849 if (tan_phi0a<decimal_string_to_signed("-395109803",30)) then
850   tan_phi0a_ml<decimal_string_to_signed("-395109803",30);
851 elseif (tan_phi0a<decimal_string_to_signed("-25254",16)) then
852   tan_phi0a_ml<resize(resize(tan_phi0a,16),30);
853 elseif (tan_phi0a<-(decimal_string_to_signed("-25254",16))) then
854   tan_phi0a_ml<resize(decimal_string_to_signed("-25254",16),30);
855 elseif (tan_phi0a<-(decimal_string_to_signed("-395109803",30))) then
856   tan_phi0a_ml<resize(resize(-(tan_phi0a),16),30);
857 else
858   tan_phi0a_ml<decimal_string_to_signed("-395109803",30);
859 end if;
```

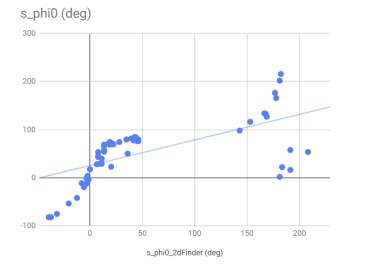
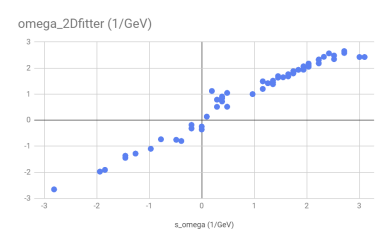
The bit size is too small,
so the signal is truncated.

- 1. Before fixing the synchronization problem of signals.
 - ρ : 25 CLKs
 - ϕ_0 : 28 CLKs
- 2. After fixing the synchronization problem of signals
 - ρ : 24 CLKs
 - ϕ_0 : 27 CLKs

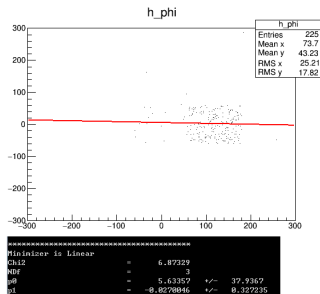
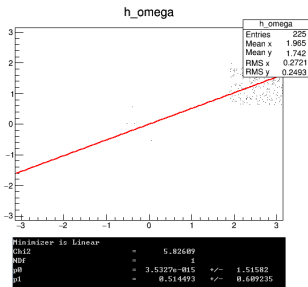
Latency of 2d fitter



Performance of 2D fitter

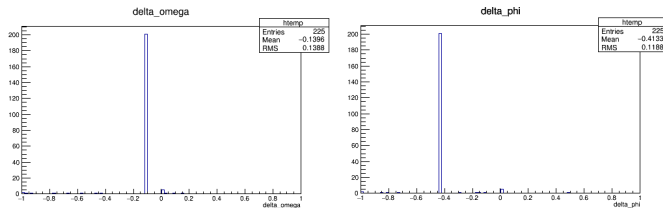


Performance of 2D fitter



Performance of 2D fitter

- 1. The resolution is defined as $(2dFitter - 2DFinder)/2DFinder$.



Conclusions and to do

- 1. After fixing the problems mentioned, the 2d fitter performs well.
- The 2d fitter will be fit into the 3D firmware. Need to solve the following problems.
 - Data format problem.
 - Resources usage problem: the current 2D fitter may use up all the resources because of the large bit size of ρ and ϕ_0
- TSIM vs. ISIM vs. data.