

# SVT Timing

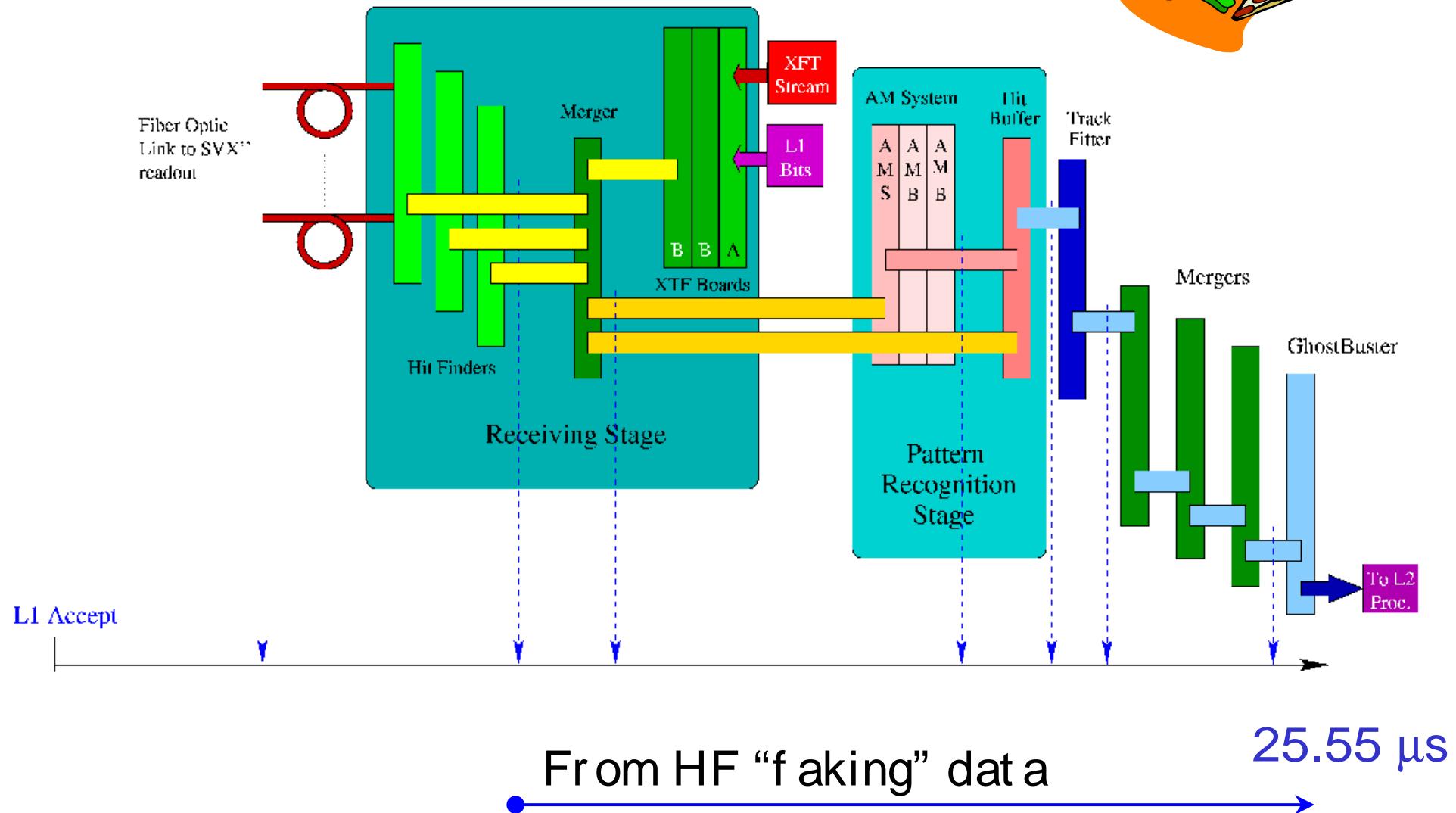
AC, BA & SVT

# How?

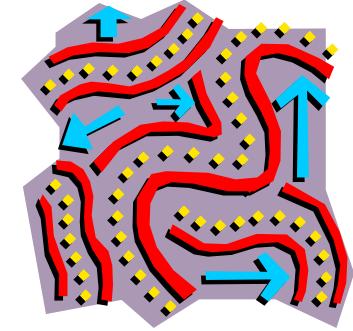


- Replace a cable with a fanout (merger)
- One of the fanout outputs is attached to a specially reprogrammed GhostBuster channel
- 2x2 ways:
  - 1) Normal data taking + SVDD
  - 2) SVTSpyMon and a GhostBuster
  - 3) SVX II beam data
  - 4) Real data hits re-played by the HF outputs
- What we measure is L1 $\rightarrow$ EE (1 & 2) and/or L1 $\rightarrow$ 1<sup>st</sup> word (1 only)
- Yet “unknown” additional merger latency (few 110 ns)
- ..but precise measurement of relative timing

# SVT Slice



# Mergers



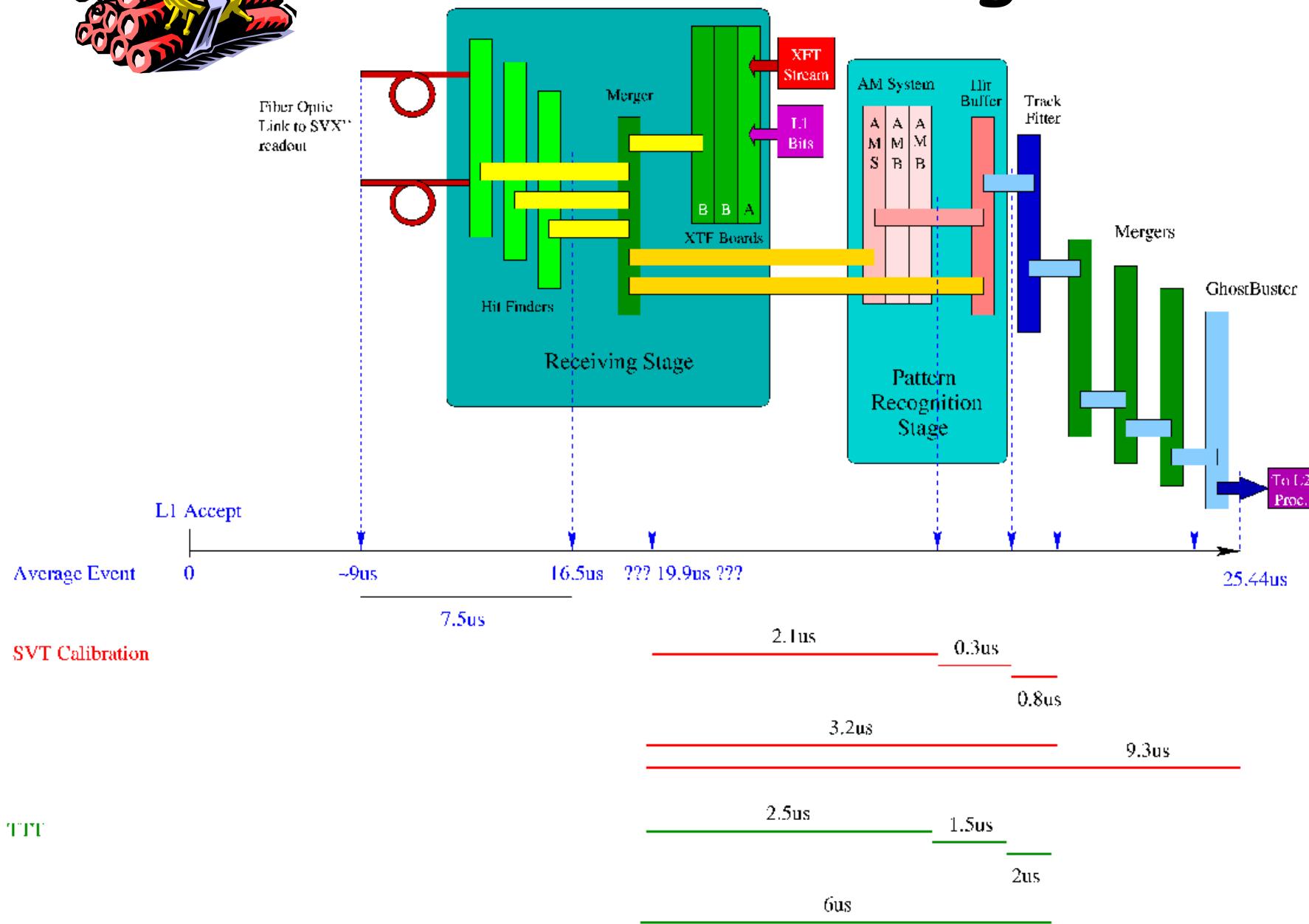
- 4 input-2 output device
- Merges data streams
- 2 possible ways of doing that
  - **Non deterministic:** “first come first serve” until end of event
  - **Deterministic:** Sequential processing of inputs (first all A data, then all B data & so on..)
- So far we've been using deterministic
  - Easier to implement and understand
  - Limited FPGA size makes it somewhat hard to implement
- Typical processing:  $(2/3) \times (\text{nwords}) \times (0.033)\text{us}$

# What we do know so far...

- Overall processing time in various conditions
  - “average” event
  - SVX II thresholds
  - track multiplicity
- Intermediate EE “crossing” times
  - Pattern rec./Track fitting
- Miss detailed merger info!



# Measured timing



# SVX II Thresholds

Two SVX special runs with thresholds set to higher values:

Run #	Threshold	Occupancy	SVT time From L1A
Regular	-	~15%	25.44 $\mu$ s
150119	9	~3%	24.78 $\mu$ s
150118	11	~3%	23.48 $\mu$ s

O(2  $\mu$ s) improvement

# Conclusions



- @#\$%&
- Three places we can gain something:
  - Si Thresholds      2  $\mu$ s
  - Merger(s)
  - GB latency      1-1.5  $\mu$ s
- Need a more systematic timing measurement
- Come to the SVT workshop!

# To do list

- More comprehensive study:
  - All streams/ boards/ wedges
  - Several samples (basically w & w/o tracks, and various SVX thresholds)
  - More details on merging effects
- Model timing into simulation



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