

Deadtime, Trigger Bandwidth and Efficiency

- What is an acceptable amount of deadtime?
 - 0 % at any L1Accept rate
 - **Operationally** this is defined as < 5%
 - Currently this limits us to 20 kHz L1A rate
- How to take more B triggers while minimizing deadtime?
 - Increase L1A rate into L2. Requires:
 - Speeding up SVX readout
 - Speeding up SVT processing
 - Speeding up L2 processing
 - Increase SVT efficiency
 - **Increase L1A rate AND SVT efficiency!**
 - Increase SVT efficiency at the expense of the L1A rate
 - “Load Leveling” ?
 - Most of the above

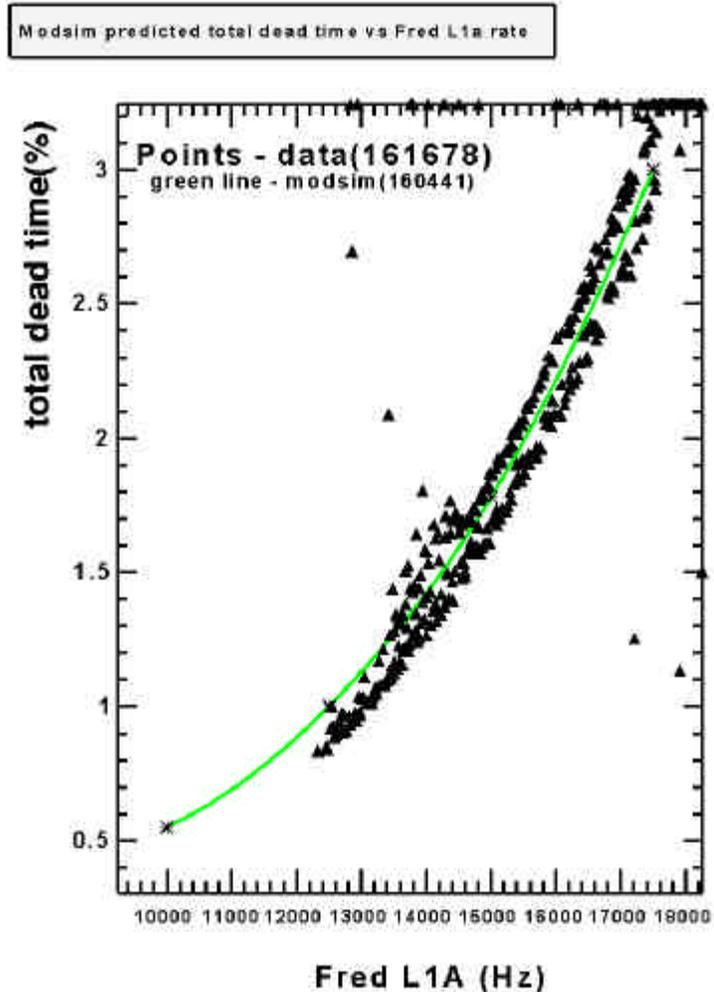
Greg Feild
Peter Wittich
Trigger Hardware Meeting
5/9/2003

Current trigger rates and deadtimes

Run 161678 – Trigger and DAQ remarkably well behaved

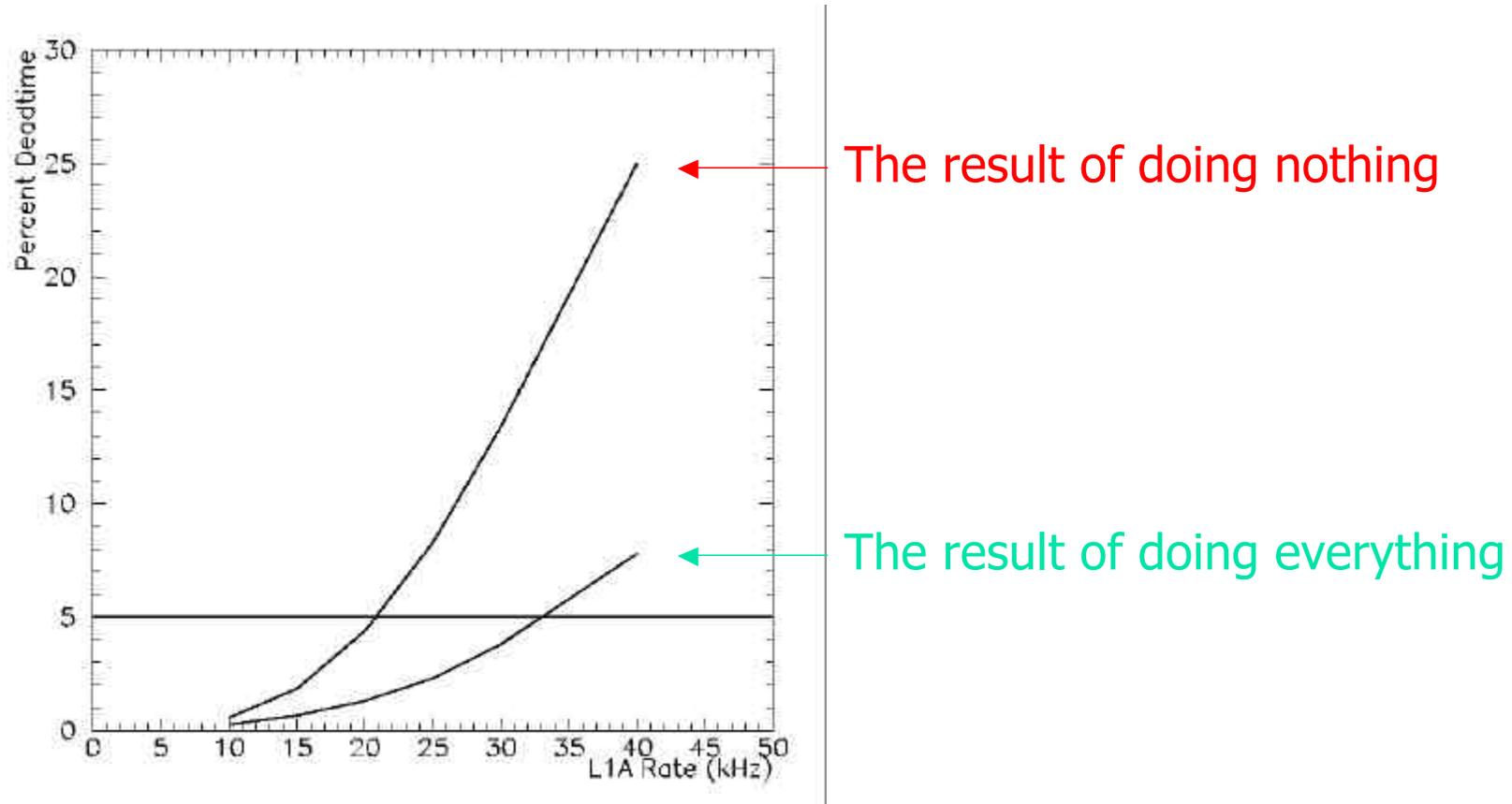
3% deadtime @ 17 kHz

Deadtime vs. L1Accept rate
Comparison of data to simulation



Trigger rates v. deadtime – ModSim Predictions

Graphical Representation of results shown at last meeting



Percent deadtime vs. L1A rate

Trigger rates and deadtimes - ModSim

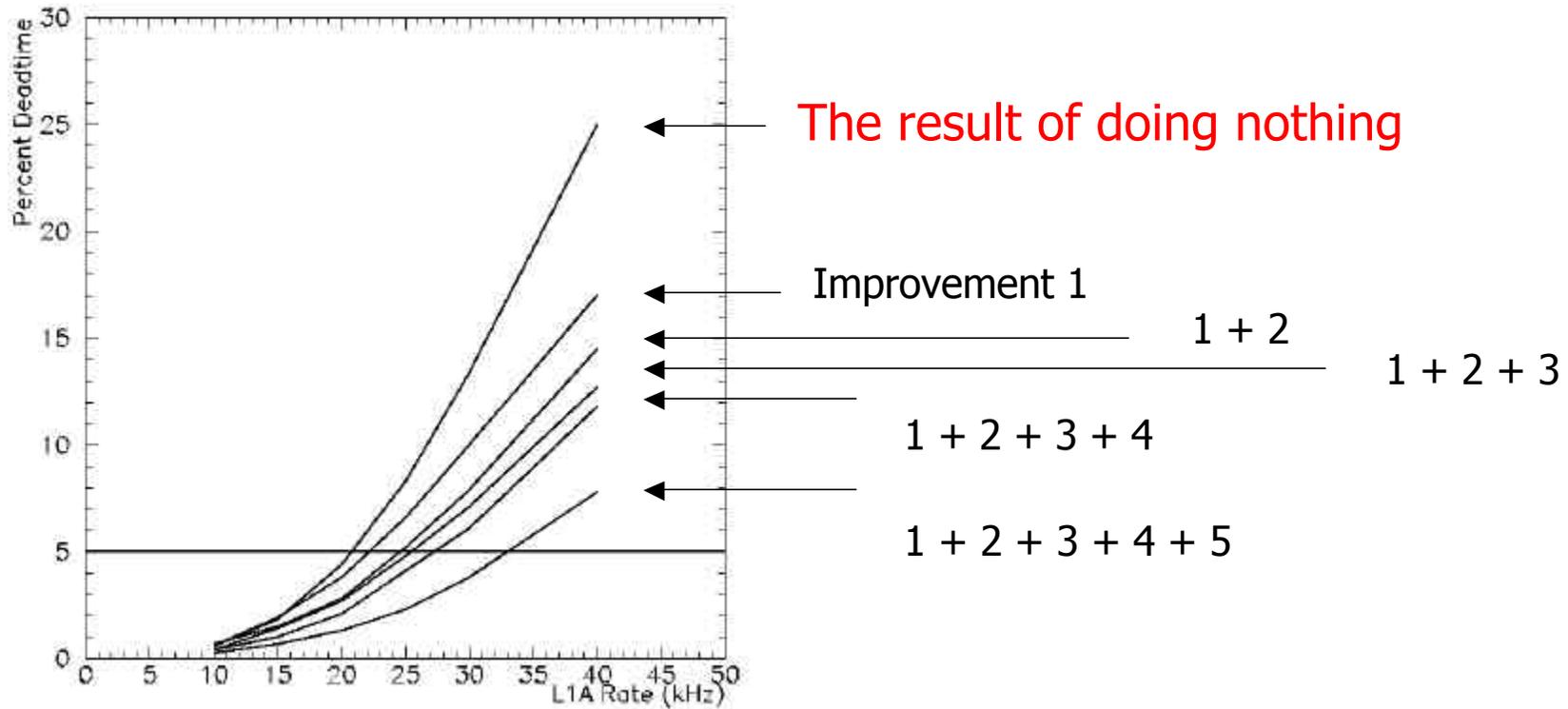
What is “everything” ?

1. Move to 2 SRCs – this is happening now
2. L2 improvements
 1. Shorten DMA configuration by 2 μsec
 2. Shorten L2 mean processing time by 3 μsec
 3. Shorten L2 processing tail by 7 μsec
3. Change from 8 to 7 bit digitization for SVXII (9 μsec \Rightarrow 6.5 μsec)
4. Shorten SVT mean processing time by 3 μsec
5. Truncate the long SVT processing tail

Many of these improvements are speculative!

Trigger rates and deadtimes - ModSim

Graphical Representation of results shown at last meeting



Percent deadtime vs. L1A rate

Note: All improvements are cumulative

Summary

- System works well but runs slower than planned
- If we want to run faster (20 kHz \Rightarrow 30 kHz) then we need to make improvements everywhere. **There is no one fix.**
- Not all suggested improvements may be possible
- There may be some we have not yet thought of
- This work will require beam tests and downtime
- Suggest capping the L1Accept rate at 20 kHz until the improvements start rolling in
- Exception: End of store studies at higher rates for Silicon studies and comparisons to ModSim deadtime model