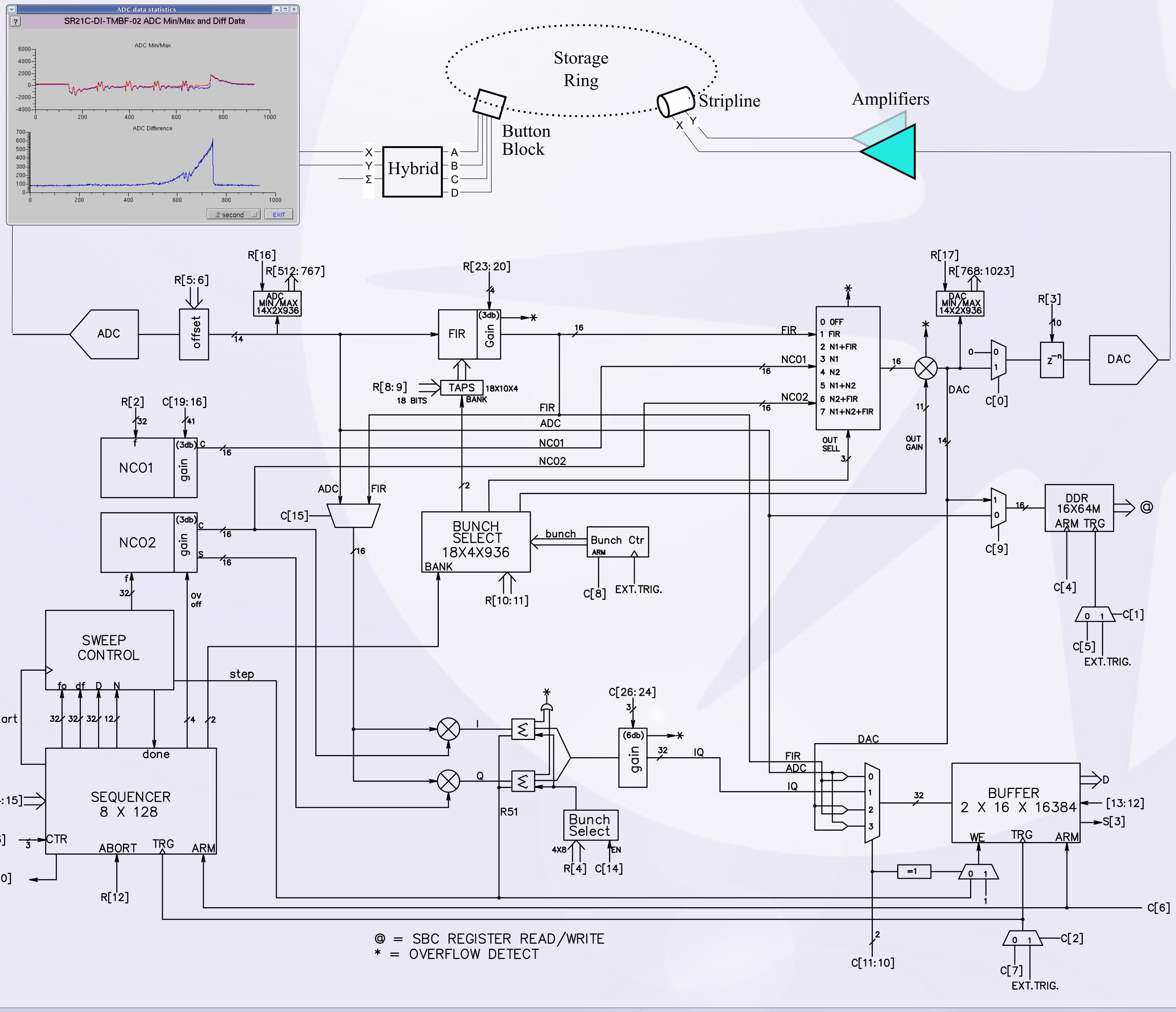
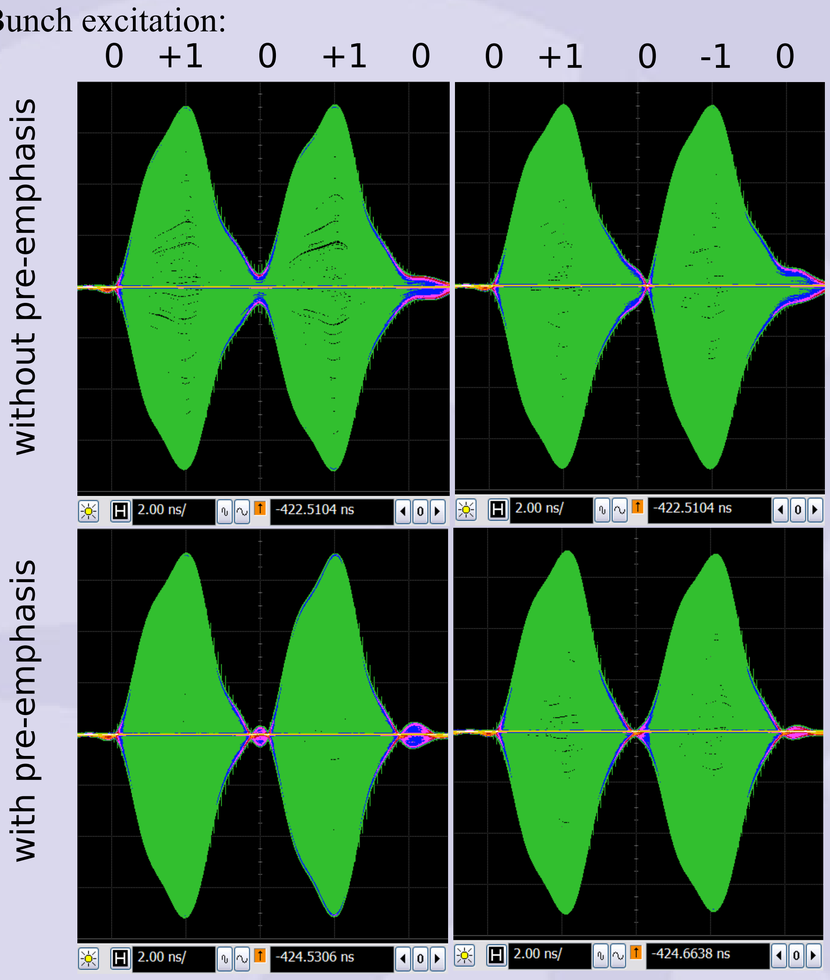
Capability Upgrade of the Diamond Transverse Multibunch Feedback

Michael Abbott, Guenther Rehm, Isa Uzun, Diamond Light Source, Oxfordshire, UK



Bunch excitation:



Exciting two bunches to clean bunches adjacent to an isolated single bunch: need pre-compensation to reduce crosstalk

Internal architecture of new DLS TMBF.

Above we see the detailed architecture of the FPGA implementation for the TMBF. To the left is shown the effect of pre-emphasis on the DAC output on a train of five bunches. To the right we see that closely adjacent bunches can have very different tune measurements, so performing simultaneous measurements on several different bunches can be useful.

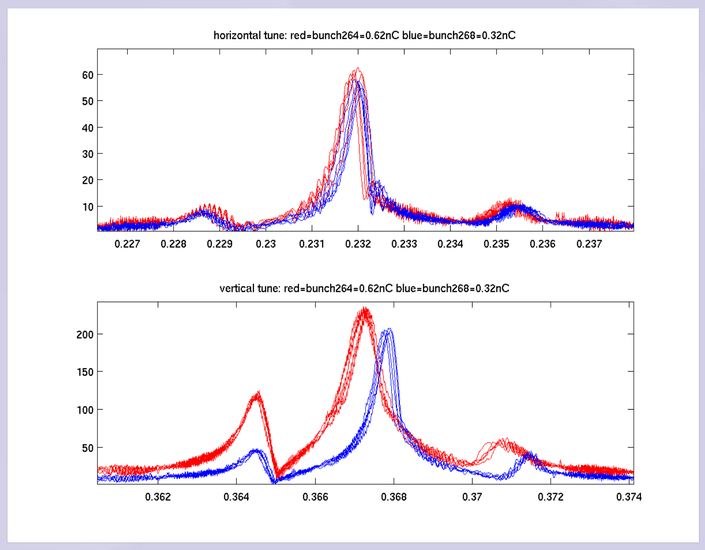
```
Device Utilization Summary:

   Number of BUFGMUXs                    7 out of 16      43%
   Number of DCMs                        3 out of 8       37%
   Number of External DIFFMs            20 out of 320      6%
      Number of LOCed DIFFMs            20 out of 20     100%

   Number of External DIFFSs            20 out of 320      6%
      Number of LOCed DIFFSs            20 out of 20     100%

   Number of External IOBs             244 out of 644     37%
      Number of LOCed IOBs             244 out of 244    100%
   Number of MULT18X18s                 68 out of 136     50%
   Number of RAMB16s                   111 out of 136     81%
   Number of SLICEs                   7950 out of 13696   58%
```

FPGA resource utilisation report: design now limited by available block RAMs and multipliers (some block RAMs conflict with multipliers!)



Tune measurement showing different tunes for adjacent bunches. This shows the potential value of simultaneous tune measurement on several different bunches.

diamond