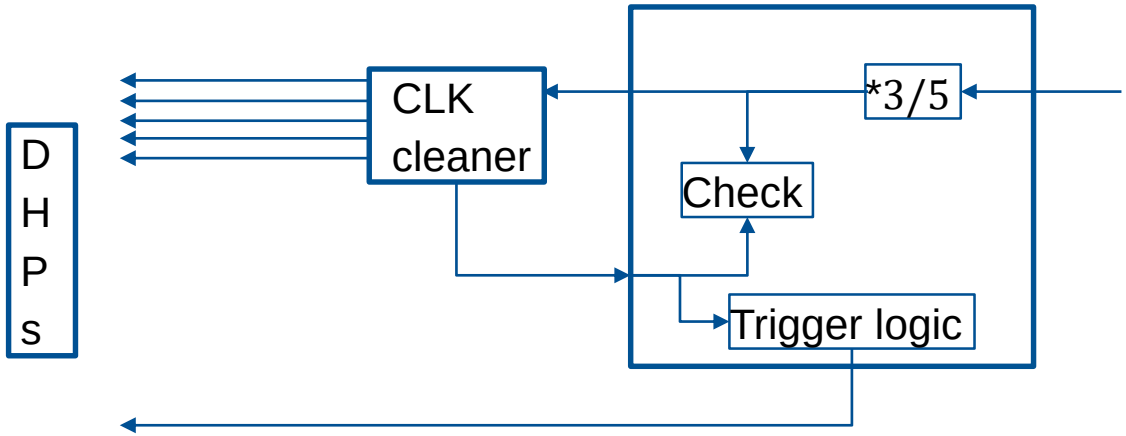
DHI clock issue

- Instabilities first observed during testing the gated mode
  - Certain internal counters behaved strangely and lost synchronization
  - Added capacitors to fix pickup of noise induced by the power lines to the clock-recovery chip
  - Implemented PVs to monitor if this problem occurs
    - Check if revo signal arrives at a calculated time (Only checked for one output)
    - Check if counters with different clocks run synchronously

    ⇒ Both things seem not to be the case on DHI58

Current Scheme



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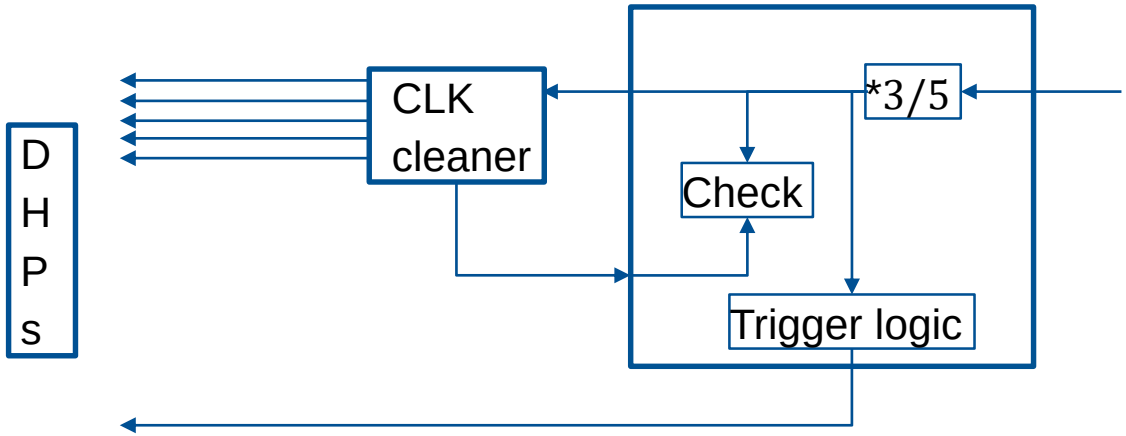
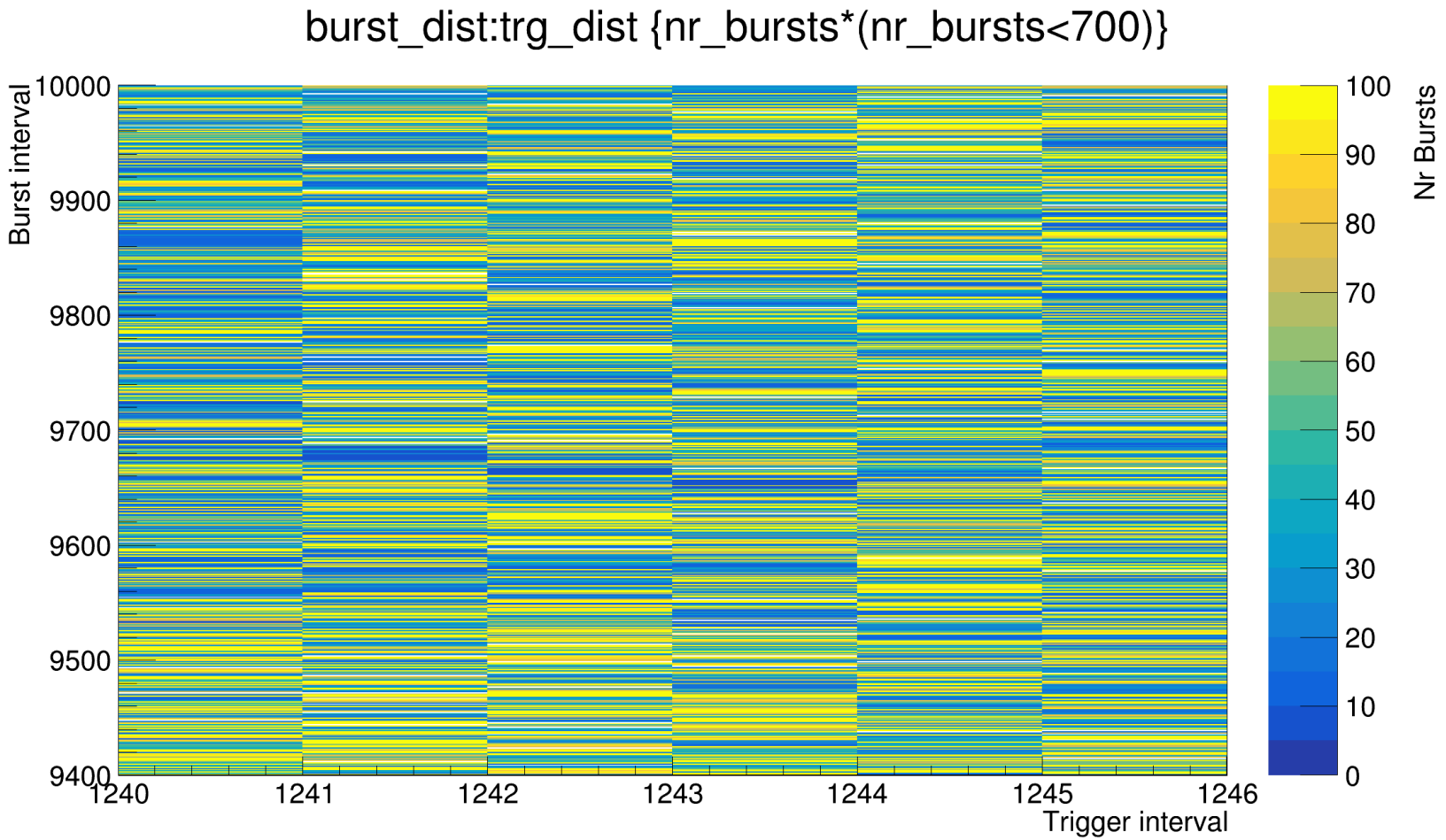
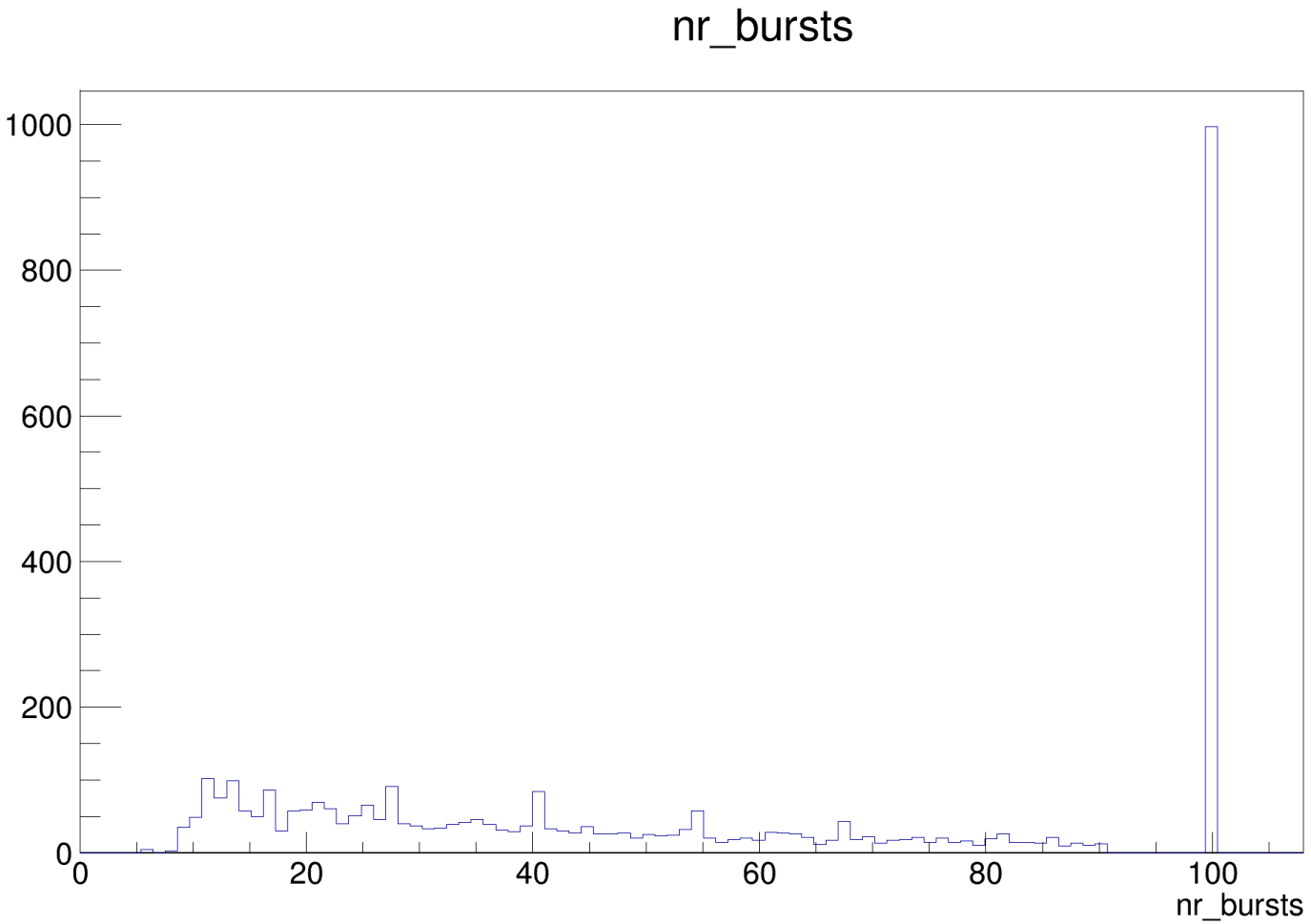
New Scheme => deployed 27.5 => fixed occupancy drops on 1051



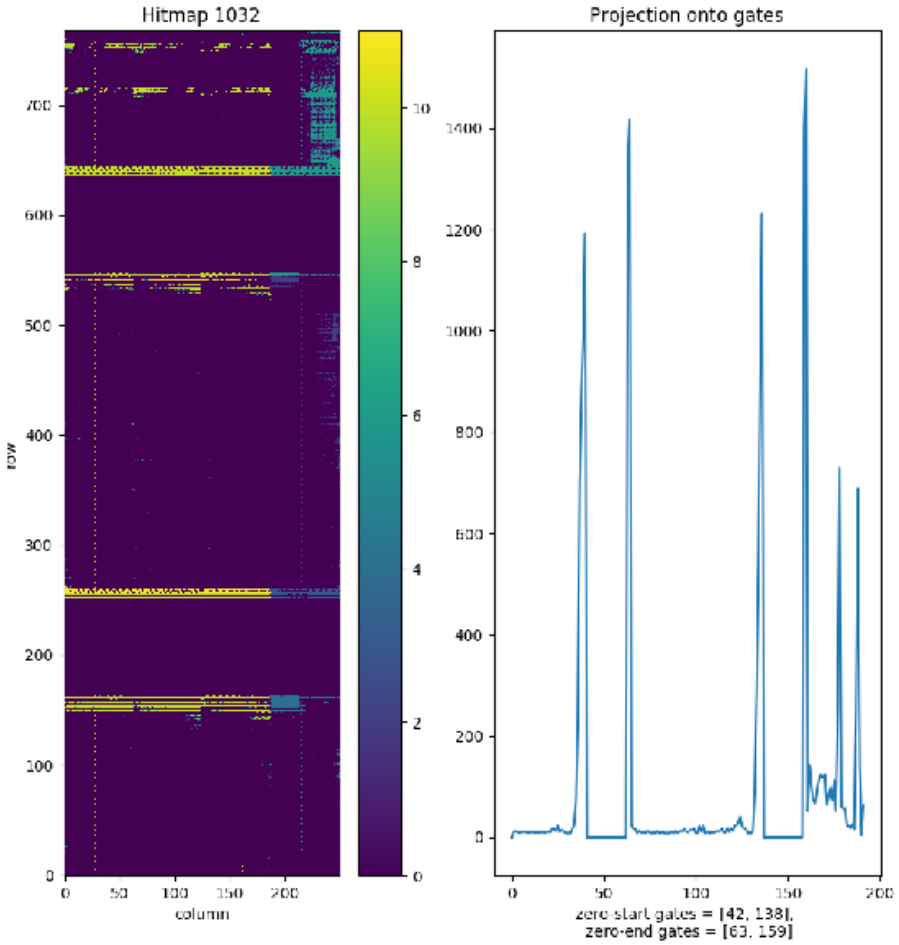
Occupancy drop: Parameter scan



Occupancy drop: parameter scan (Nr bursts)



Gated mode tests at DESY



Gated mode tests at DESY

Local gated mode emulation

- Testpattern /standby
  - Scan of trigger inhibit length and offset parameters
  - Check effect of DHP latency
  - Check effect of kicksub parameter
- Peak, noise with timing pixels
  - Scan of gate_length, gate_offset
  - Scan of relative phase of trigger inhibit to pedestal fluctuations

    => DHP latency + ~8 gates from online monitor, exact values from detailed analysis
- External pulse generator
  - Asynchronous to FTSW, set length of gated mode to 1800 revo cycles (~18us)
  - Kick signal with 50Hz, 25Hz => gated mode visible in 90%, 45% of the events

DHC features

1. DHC_20190520_1038 (deployed 30.5.2019)
   - Generate local triggers while frames are synchronized by FTSW ✓
   - Local trigger generation synchronized over all 4 DHCs (due to 2 revo-cycles per frame)
     Using revo9 signal from FTSW ✓
   - Backpressure test to DHE (needed for future firmware) ✓
   - Counters for link losses from FTSW ✓
   - Gated mode implementation (still with length information from FTSW) ✓
2. Currently being tested at DESY
   - Configurable DHE order in data stream ✓
   - Gate mode length information from slow control ✓
     - Data being analyzed by Varghese
   - DHP resynchronization during a run ✗

     Intermediate version showed some instabilities during tests at KEK ✗