

Torino PET electronics status

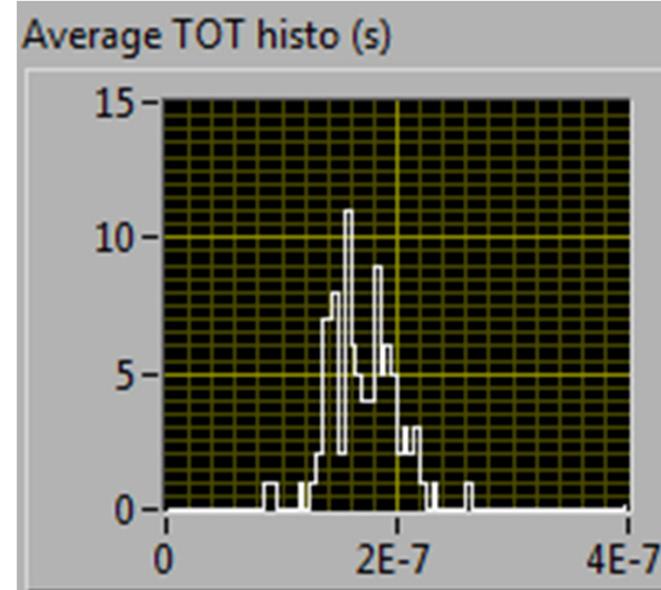
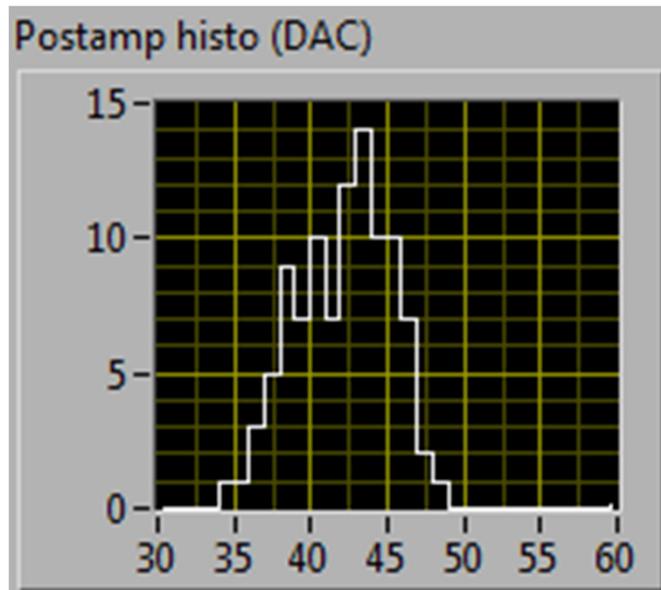
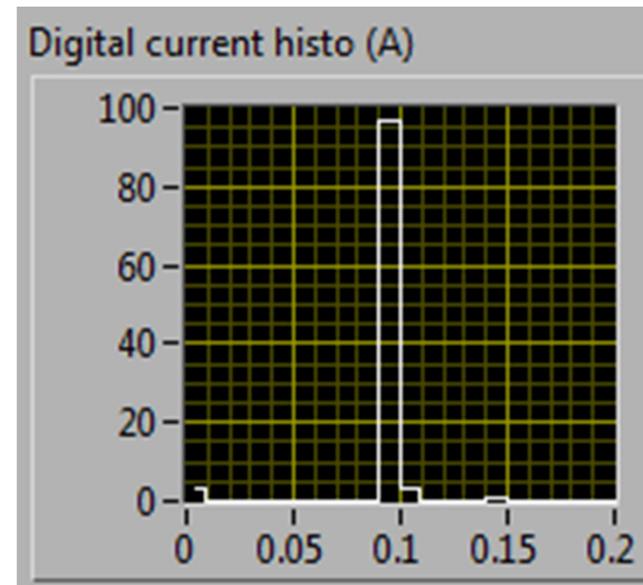
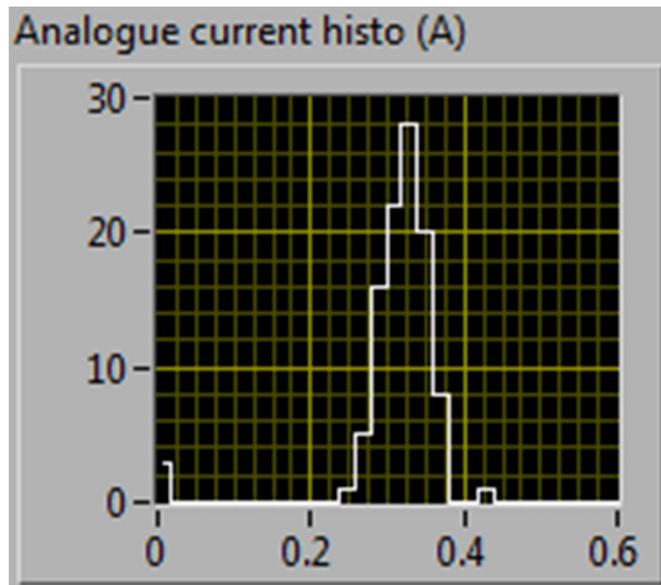
- Tx and Rx firmware
- ASIC testing
- FE board production
- FMC adapter production
- Tx board procurement
- Production timeline

Firmware

- First feature-complete version of Torino contribution to Rx firmware (Ethernet PHY logic and event reception) tested in hardware and delivered end of May
- Tx firmware is practically feature-complete but not yet fully tested
 - added calibrated event transmission (still UDP packets, but different data format)
 - fine time special case correction
 - expanded possible board addresses to 20, event target address user programmable
 - added low and high TOT threshold on channel by channel basis
 - added individual TAC masking
 - added filter of anomalous “Tcoarse = Ecoarse = 0” events
 - project uses ~ 75% available logic, ~ 70% available DSP, ~ 80% available block RAM
- Remaining issues
 - Tx event decoding and calibration logic is not (yet) fast enough for DDR operation
 - software for configuring Tx event calibration logic and decoding and verifying calibrated Tx events data
 - simulation of high event rates with high frame multiplicity to verify that event loss problem has been understood and solved

ASIC testing

- Total of 286 ASIC's tested at Torino (plus 40 at Pisa)
 - yield of “perfect” devices ~ 60%
 - typical defects are either dead TAC's, dead channels, or channels with very low TOT
 - allowing the use of chips with either one channel with E-TAC problems (EFine is barely significant for TOT) or 1 bad T-TAC (mask in Tx) the yield rises to ~ 75% without causing a significant reduction in detector efficiency
- But... number of tested ASIC's remaining at Torino is 54 Torino + 40 Pisa
 - Tofpet was designed in collaboration between LIP and INFN-Torino for the ENDOTOPPET-US project
 - LIP group had not anticipated yield problems and were in great difficulty with production of their 2-chip boards and close to the end of the project extension
 - Torino solved their problems without delaying INSIDE
- Probe station tests will proceed in parallel with board bonding



Chip-to-chip uniformity is not Tofpet's strongest quality but that's the risk with major last minute design specification changes (move to no external reference DAC's)...

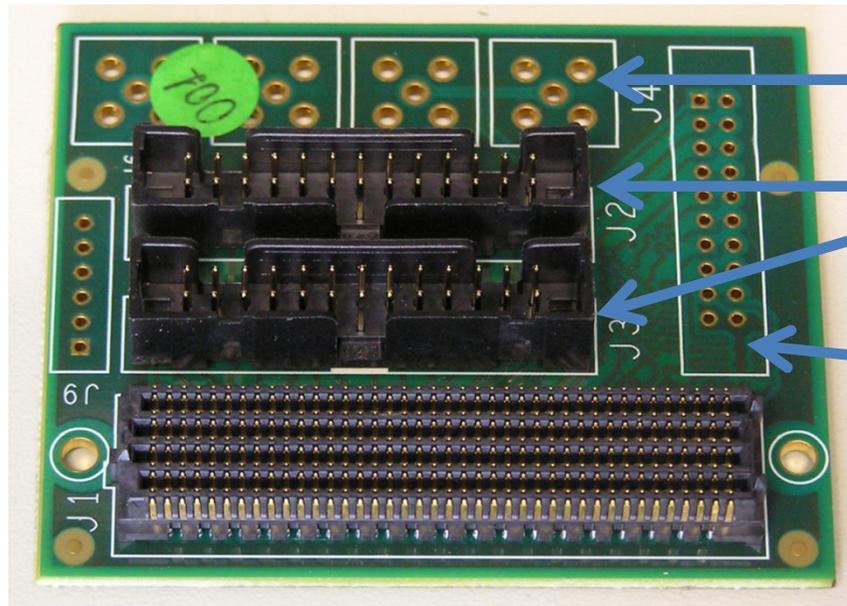
FE board production



20 new boards delivered (2 being mounted at time of photo), 2 original boards at Pisa, plus 4 more to be repaired. 2 new boards have been completed and tested, 2 are being bonded

Delay of two months due to RS Components not respecting declared delivery date at time of order for the Samtec connectors

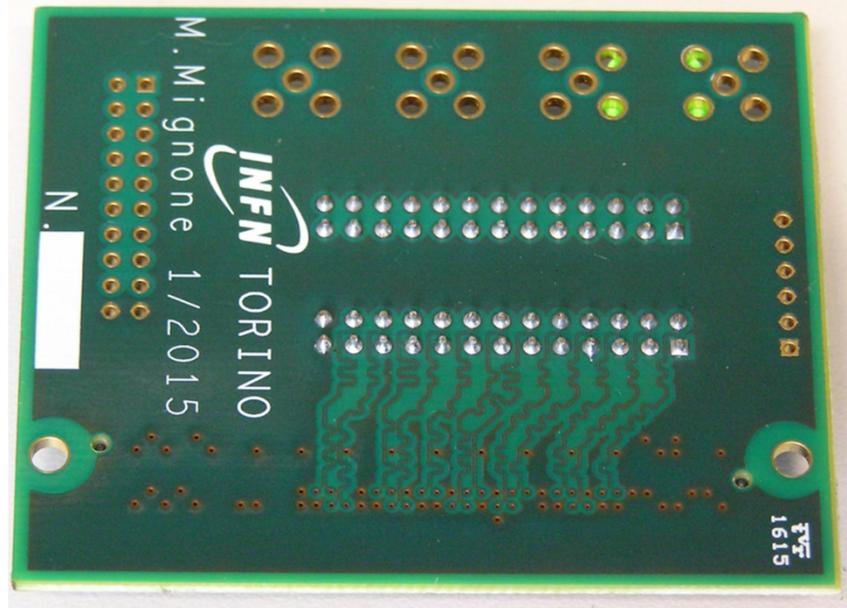
Dedicated FMC adapter



2 SMA pairs for master control signals

2 26-pin IDC connectors for FE board I/O

20-pin IDC connector with 9 LVDS pairs for eventual additional functionality



FMC adapter production



25 adapters delivered, 1 tested successfully

Tx board procurement



22 new boards delivered (plus one existing). All passed built-in self test

Production timeline

- RS delay has pushed FE board production into holiday period
 - constant availability of technical support is not guaranteed
 - best case is all boards tested and ready by end of July
 - detector box construction depends on when MEPA problems resolved
 - need detector modules at Torino in time for detector box construction
 - need power supply at Torino as soon as possible to study grounding and control software
- Remaining work
 - definition and procurement of cables and connectors for PET boxes
 - clock and reset distribution board procurement
 - PET box assembly and test