bPID (TOP) front-end electronics: SCROD and board-stack

2 * SFP connectors

mini-USB + cypress fx2lp

cat7 remote clocks, trigger and jtag

single bPID FEE “board-stack” module (2011 beam-test version)
bPID (TOP) front-end electronics: SCROD / DSP_cPCI

- **front-end:**
  - SCROD is the FPGA / controller board for the bPID front-end electronics modules. Each SCROD:
    - controls 16 ASICs, corresponding to 128 channels of waveform sampling readout
    - has two fiber optic links, a USB interface and the ability to accept remote clock, trigger and jtag programming
  - IRS2 is the ASIC to digitize the PMT pulses

- **back-end:**
  - DSP_cPCI\(^1\) is the cPCI board on the back-end that interfaces with SCROD via fiber link and collects and archives data

\(^1\)cPCI being used only for December, 2011 FermiLab beamtest; after that, FINESSE (DSP_FIN) will be used
bPID (TOP) front-end electronics: SCROD firmware status

- SCROD firmware\(^1\) performs a variety of tasks:
  - accepts clocks and synchronous trigger from FTSW\(^2\) (has problems resynchronizing after cable disconnect/reconnect)
  - controls sampling, conversion and readout of 16 ASICs with DACs and digital interface
  - sets 240 channels of DAC via I\(^2\)C:
    - uses optional feedback loops to keep ASIC behavior nominal over temperature range for 48 of the DAC channels (partially unimplemented/untested)
  - fiber optic link (using raw RocketIO/Aurora; not Belle2Link):
    - accepts commands via fiber to soft trigger, set DAC values, set feedback loop goals, etc
    - uses fiber link to do all readouts\(^3\)
    - second SFP port (for sending data to global trigger) not used yet
- preliminary documentation available\(^4\)

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\(^1\)mostly in VHDL; here are the instructions on checking out svn repository
\(^2\)accepts 127.216MHz and 21.2MHz clocks; trigger is synchronous to 21.2MHz clock; can use on-board oscillator if FTSW not available
\(^3\)fiber link data is uncalibrated non-zero-suppressed raw waveforms plus some formatting and other data; 73920 bytes per event per SCROD / front-end electronics module
\(^4\)documentation available here (general info), here (how to use front-end electronics) and here (how to use backend electronics/software)