

# Some Thoughts on FELIX Development Within EPIC

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# Setup

- we expect to obtain 1 FELIX 155 from ATLAS
  - caveat: the board needs to stay at **BNL**
- what we need at BNL, hardware
  - find a suitable lab where the board will be housed
  - suitable (massive) PC
    - needs to be remotely accessible via e.g. ssh
  - **FELIX installed in this PC and connected to JTAG**
- software and firmware
  - Vivado licenses?
    - we started this discussion last week at the DAQ Mtg
  - current board's source firmware, PC software, manuals, guidance...
    - there's an entire ATLAS group of people and a mailing list ⇒ need to start participating
      - NB, I'm on it but so are others...

# Setup II

- the lab location is also expected to be able to house our various RDO prototypes
  - e.g. AC-LGAD Readout Chain hardware is currently being setup at BNL too and we expect to connect it to the FELIX in a “few” months
  - this location decision should come soon...
- the FELIX PC should be reachable remotely via ssh
  - we can timeshare access to the FELIX board from different developers around the globe
    - note that different RDOs from different groups can be (and should be) connected to different input fibers of the FELIX
      - this makes switching between different RDO developments simply a matter of downloading different firmware using the JTAG interface
  - also, nobody wants to sit in a noisy lab for no reason (and I see no reason majority of the time)

# Peopleware roles

- EPIC should form a group of experts (users?) of the FELIX boards
  - we can't rely on CERN (or ATLAS), obviously
  - we have our own hardware specifics (e.g. interface to the accelerator, timing, ASICs, etc)
  - we have our own software/firmware streaming specifics
- I suggest we form a group within EPIC with the following “roles”
  - someone responsible for the hardware setup at BNL
    - installs, maintains, powers on/off PC, updates PC software, etc.etc.
      - can be a tech?
  - firmware role
    - responsible for the FELIX FPGA firmware and integration of various needs
      - e.g. specific ASIC data formats, interfaces to RDOs, etc.
  - PC software role
    - responsible for the libraries and documentation on how to access and “talk to” the FELIX board from the PC
      - device drivers, documentation, code libraries
  - overall head/manager
    - maintains coherence and external interfaces to
      - accelerator, streaming, Run Control, etc.

# Summary

- we should set up the FLX-155 in a lab and make it ready for remote access
- **and we start exploring** (in my preferred order):
  - IpGBT interface to the RDO
    - e.g. how to execute simple commands on the host PC to R/W IpGBT registers
    - how to initiate I2C commands from IpGBT to ASIC
    - how to modify FELIX firmware to get rid of ASIC's "IDLE WORD"s
    - etc.etc.
  - streaming interface over PCIe
    - e.g. how is this done? how to capture streaming data from the ASIC (eventually)?
  - non-IPGBT interface to RDO in conjunction with e.g. calorimetry (Norbert et al)