

TevBPM Upgrade Hardware Meeting, October 27, 2003

We started with three possible architectures for the digitizing and data path for the BPM hardware, and the advantages and disadvantages are listed below.

EchoTek (Recycler Style)

Advantages:

- Already in operation in Recycler, hardware design time minimal
- Digitizer and downconverter satisfy Tev BPM requirements

Disadvantages:

- On-board processing and memory configuration not optimal for Tev BPM requirements
- Some question whether Slot 0 processor could handle necessary data rates in this configuration.

EchoTek (Damper Style)

Advantages:

- Very flexible, all functions programmable with big FPGA
- High sample rate (200 MHz), requires simple low pass on analog signal
- Prototype complete and tested, little hardware design required

Disadvantages:

- 12-bit digitizer vs. 14-bit digitizer for slower (80 MHz) clock speed
- Requires programming FPGA to handle digital downconvert, FIR filters, and decimation at 200 MHz rate

Electron Cooling BPMs

Advantages:

- Digitizer and downconverter satisfy Tev BPM requirements
- Already commissioned and tested system
- Designed with on-board DSP and memory

Disadvantages:

- Not a commercial system, all design and construction

done in house

- DSP may not be optimal processor for Tev board (would prefer FPGA)

After some discussion, we came to a consensus on the basic architecture for the BPM digitizer board. The block diagram is shown in the enclosed file. Since we could think of now situation when we would not digitally downconvert the digitized data, it seemed reasonable to use a commercially available downconvert processor for the task instead of trying to re-engineer the process in a FPGA. This appears to limit our digitizer sampling rate to 80 MHz.

We then talked about two possibilities for satisfying the new architecture. One way is to make modifications to the electron cooling board to include the FPGA. Another possibility is to contact EchoTek to see if they can produce a board with the requested architecture. Information on both options will be pursued until the next hardware meeting.

The next hardware meeting will be Tuesday Nov. 4 at 10:00am in the Penthouse.