Operation of the Tevatron Abort Gap Integrator

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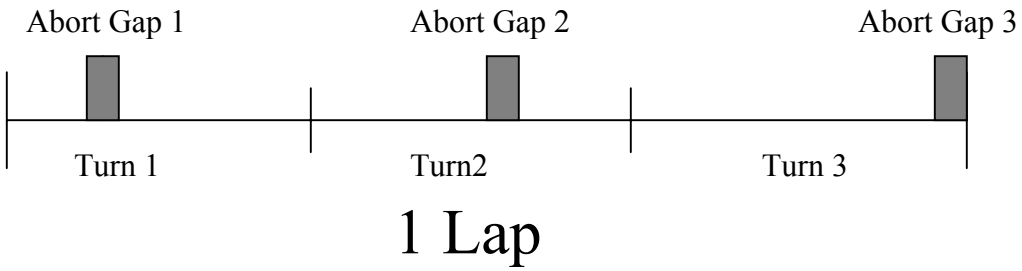
The Tevatron Abort Gap Integrator (AGI) is a new Instrumentation device used to measure the beam intensities in the Tevatron abort gaps. It does this by sensing the synchrotron light emitted with a photo-multiplier tube then integrating that signal over the appropriate periods relative to the beam in the accelerator. The AGI front-end, node tagi.fnal.gov, resides in the C0 building electronics room in relay rack C007. It is labeled "TAGI". The AGI front-end works much like the FBI front end in that there is a VRFT timing card, a Brian Fellenz built integrator and a Comet digitizer. The VRFT timing card outputs the gates for the photo-multiplier tube, the integrator and the comet board. The data collection scenario is as follows:

1. The photo-multiplier tube is gated on during the passing of an abort gap.
2. The integrator is gated on and the signal from the photo-multiplier is captured.
3. The integrated value is digitized on the Comet board.



Picture 1: TeV Abort Gap measurement timeline

This process repeats for all three abort gaps in each "lap". A "lap" lasts for three Tevatron revolutions due to the abilities of the photo-multiplier tube. (see picture 1) There are 1000 laps in each measurement for a total of 3000 abort gap readings. The readings are then copied out of the Comet board and the corresponding 1000 reads for each abort gap is averaged. This process repeats once every second.

The ACNet devices for the Tevatron AGI can be found on the ACNet console page T43<slight><15>. It appears below. The parameters are listed below with a brief description of their actual function.

- T:AGISUM: The sum of the three abort gap readings.
- T:AGIGI1-3: The individual abort gap readings. Their setting devices set the integration gates after the Tevatron proton AA marker in buckets. This is the same as the Tevatron FBI.
- T:AGISF: The Scale factor for all AGI readbacks. This is settable and is being lumberjacked.
- T:AGIOF: The offset for all AGI readbacks. Also settable and lumberjacked.
- T:AGISUB: Allows the enabling or disabling of background subtraction. Since the photo-multiplier tube is an AC coupled device, the background reading must be subtracted from the normal reading for the normal reading to be meaningful.

- T:AGIINW: This sets the width in buckets of the integration gate.
- T:AGIGTW: This sets photo-multiplier tubes HV gate width.
- T:AGIDIG: This sets the width of the pulse to the Comet digitizer board. It should NOT be changed.
- T:AGIDLY: This sets the delay after the last integration gate until the digitizing pulse occurrs. This also should NOT be changed.
- T:AGISQL: This is the squelch for the AGI sum. It can be used to remove background noise from the sum T:AGISUM.
- T:AGIBK1-3: These are the most recent background readings. To take a new set of background readings, a setting of 1 should be made to T:AGIBK1. This will put the AGI into background mode and a new set of background measurements will be taken. The AGI will return to normal mode automatically after the backgrounds have been taken. FOR THE TIME BEING – this should only be done by experts as the shutter that allows background measurements is operated locally at C0.