

# LA-UR-11-10089

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Title: BPPM Data acquisition modes

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Intended for: Report



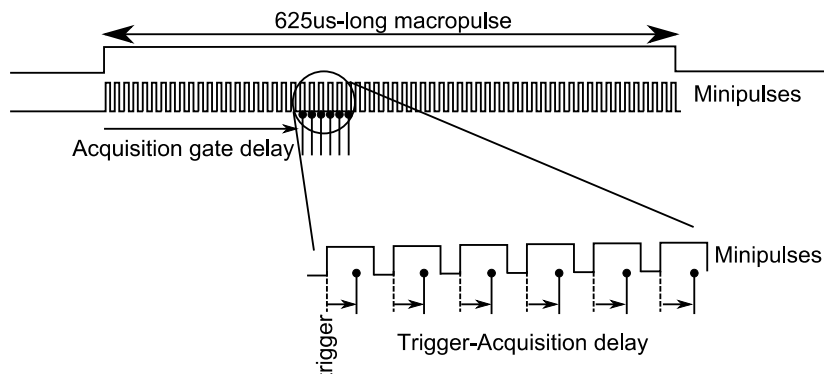
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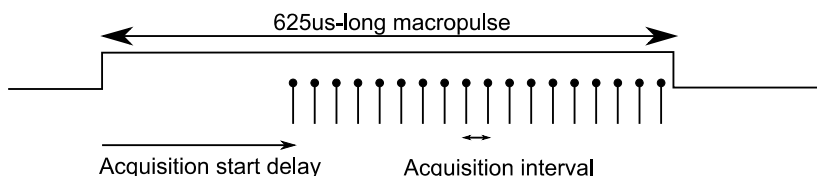
## BPPM Data acquisition modes

Within a macropulse we need to collect data several times, starting after a user-defined delay from the beginning of the macropulse. For un-chopped beams the acquisitions should occur at some rate that can be adjusted by the user; the maximum rate should be a few MHz. For chopped beams one measurement per minipulse should be available, with some user-adjustable “countdown”, that is the user should be able to specify that a measurement be made for one out of two minipulses, or one out of three, or four, etc. The user should also be able to specify the delay between the beginning of a minipulse and the measurement, and this delay should be consistent among the minipulses.

### Intra-macropulse data acquisition for chopped beams:



### Intra-macropulse data acquisition for un-chopped beams:



## Data-Acquisition repetition rates

The accelerator is capable of producing macropulses at a rate of 120Hz, and the BPPM system needs to be able to make measurements at that rate. We do not anticipate a need to provide EPICS records at 120Hz, but we will sometimes require measurements from many successive macropulses, with some post-processing on the BPPM IOCs to produce reduced data sets that can be served onto the network for further analysis.

In short, this requires producing measurements at a maximum rate of 2.8MHz, for about 1ms, 120 times per second.

### Data serving

With the measurements acquired by the BPPM processor, the data need to be served to meet the user's needs. Three modes are described below. Two of the modes require a single number per macropulse from each BPPM; this should be the average of the several measurements made during the macropulse. Brief descriptions of the modes are given below, followed by graphical depictions of the modes.

#### Time mode

In time mode, waveform-type data should be available. That is, the intra-macropulse data as described above.

#### Per-BPPM mode

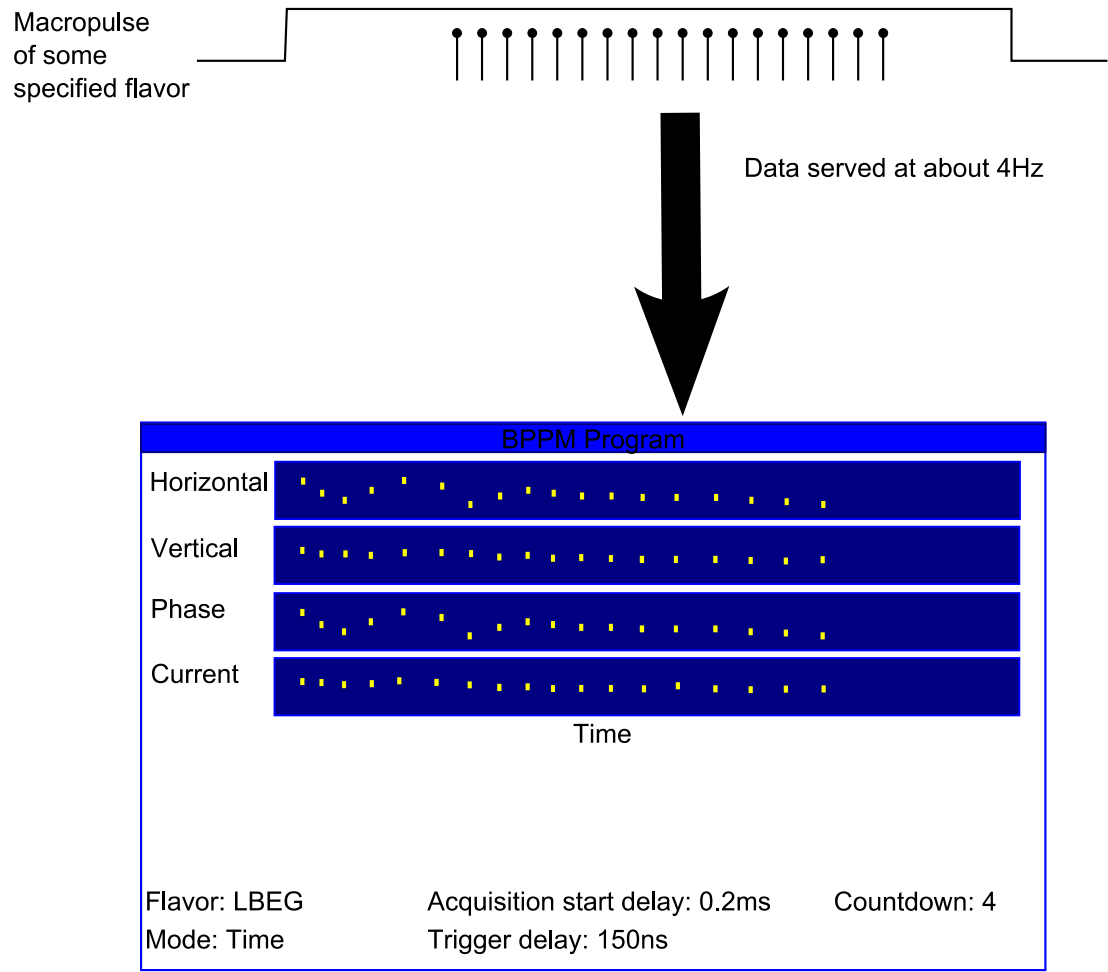
In per-BPPM mode, a single measurement per macropulse from each of several BPPMs should be available. The single measurement should be the average of the intra-macropulse measurements for each BPPM.

#### Gate-stacked mode

In gate-stacked mode data from several macropulses should be available. The data from a given macropulse should consist of either a single measurement (the average of several intra-macropulse measurements) or of several intra-macropulse measurements.

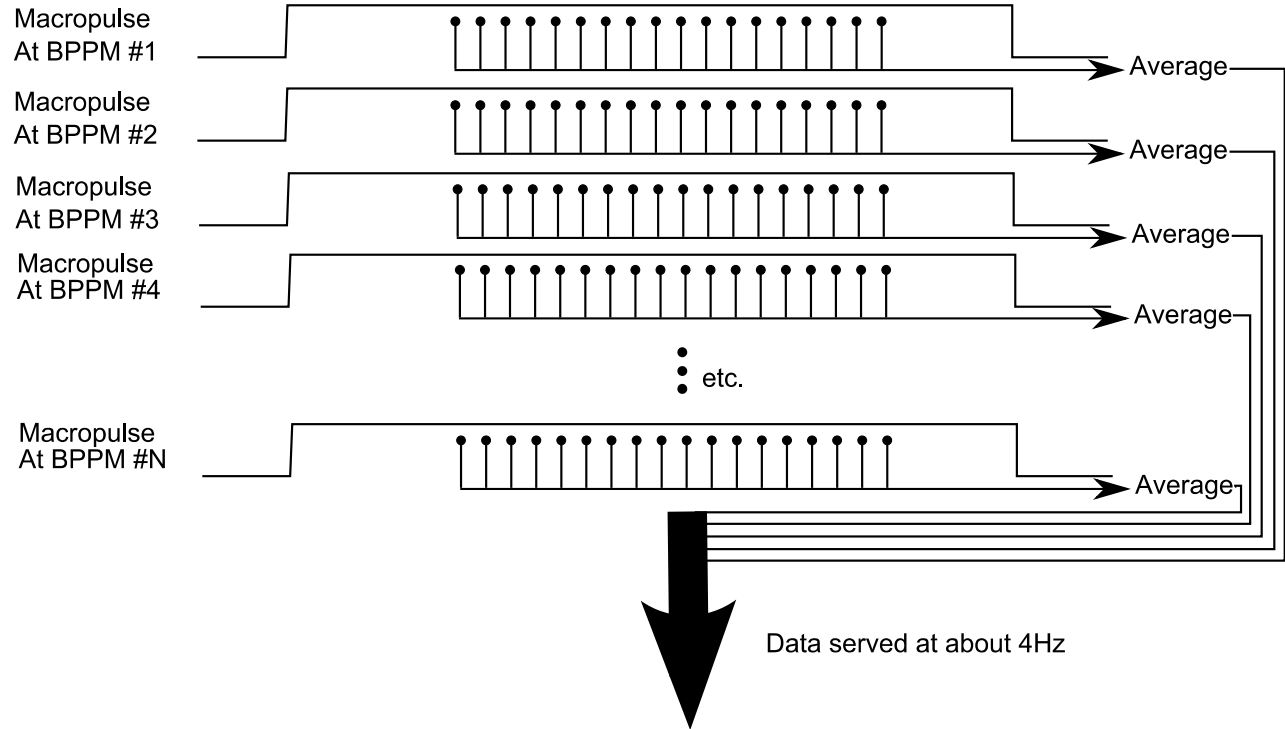
**Time mode**

Time mode is for intra-macropulse measurements from a single BPPM.



**Per-BPPM mode**

Per-BPPM mode shows the beam position along the linac. For each BPPM a single measurement is displayed. The measurements from the several BPPMs should be collected during the same macropulse.



BPPM Program

Horizontal

Vertical

Phase

Current

B B B B B B B B B

P P P P P P P P P

P P P P P P P P P

M M M M M M M M M

1 2 3 4 5 6 7 8 9

Flavor: LBEG

Acquisition start delay: 0.2ms

Countdown: 4

Mode: per BPPM

Trigger delay: 150ns

Gate-stacked mode

In gate-stacked mode, data are acquired from a single BPPM on each of several successive macropulses.

