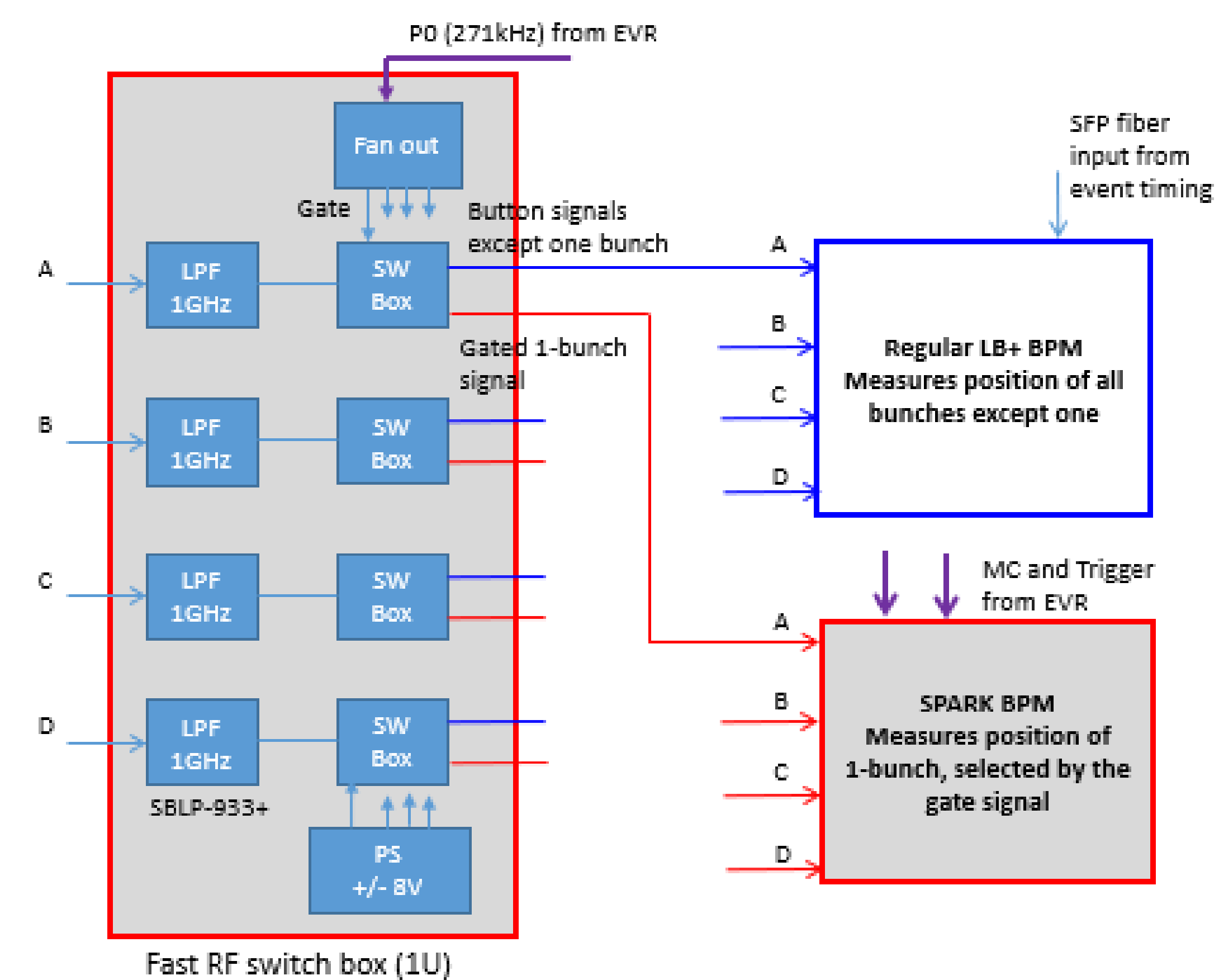


Abstract

To measure the swap-out injection/extraction bunches of the Advanced Photon Source Upgrade (APS-U) storage ring, single-pass Beam Position Monitor (BPM) electronics will be installed in the first sectors after the injection with fast RF switches. The fast RF switch will select a bunch signal to be processed by the single pass BPM electronics, and have the remaining bunches processed by the regular BPM electronics. In addition to measuring the swap-out bunch during injection, the setup will be able to carry out various other measurements of any selected single bunch (or bunches). This paper presents the performance of the fast RF switches and related electronics.

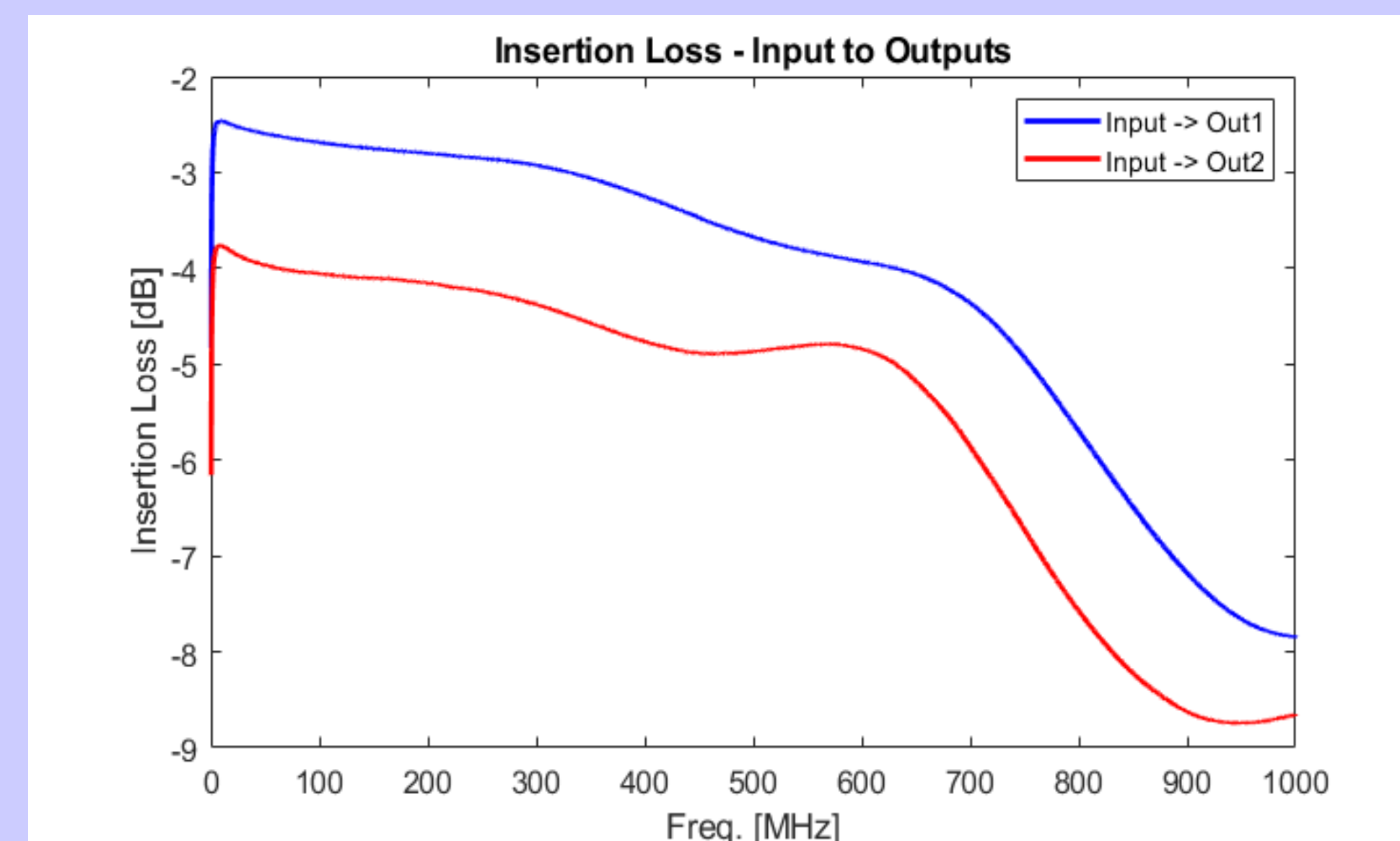


Schematic setup of the single pass BPM

Fast RF Switch Performance

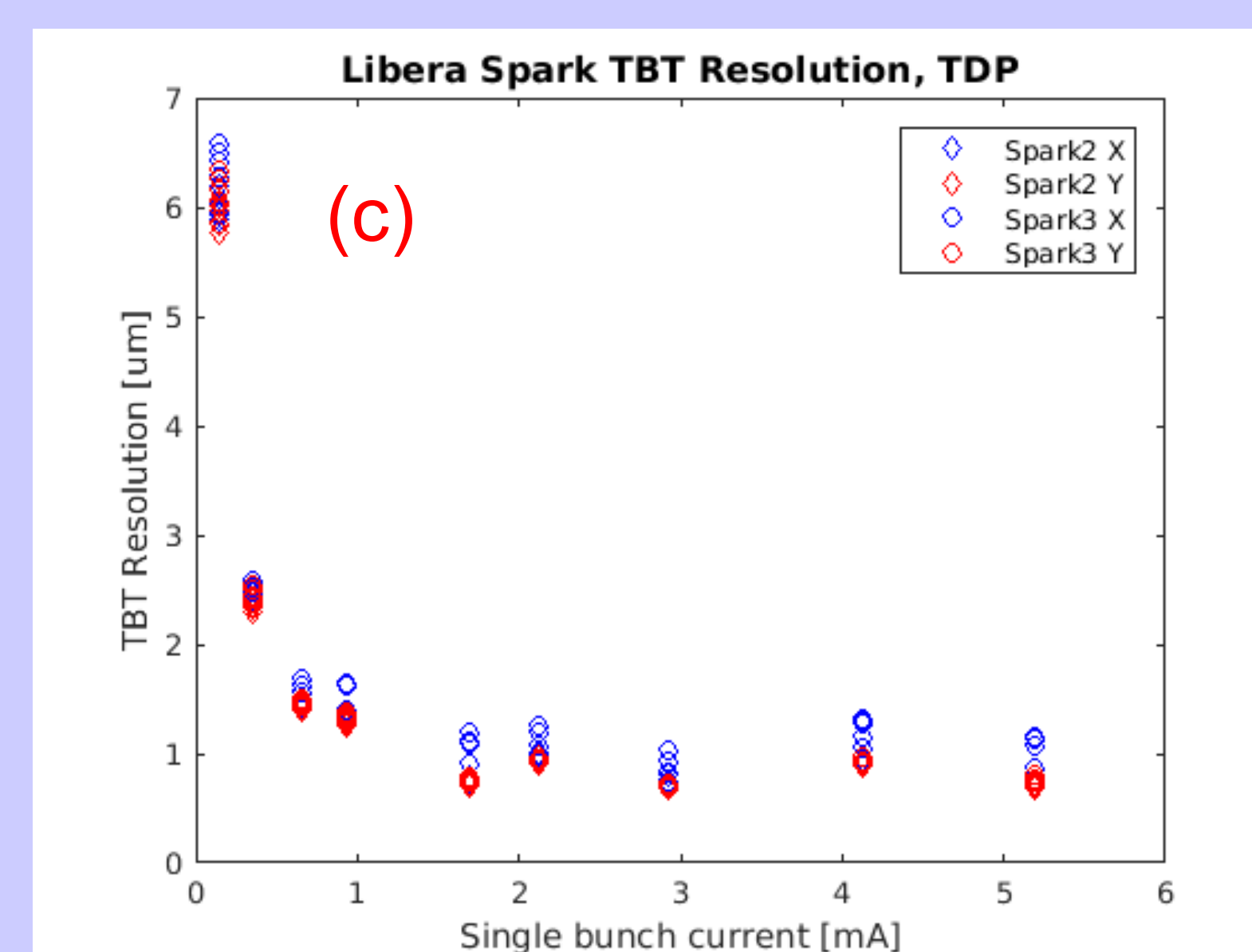
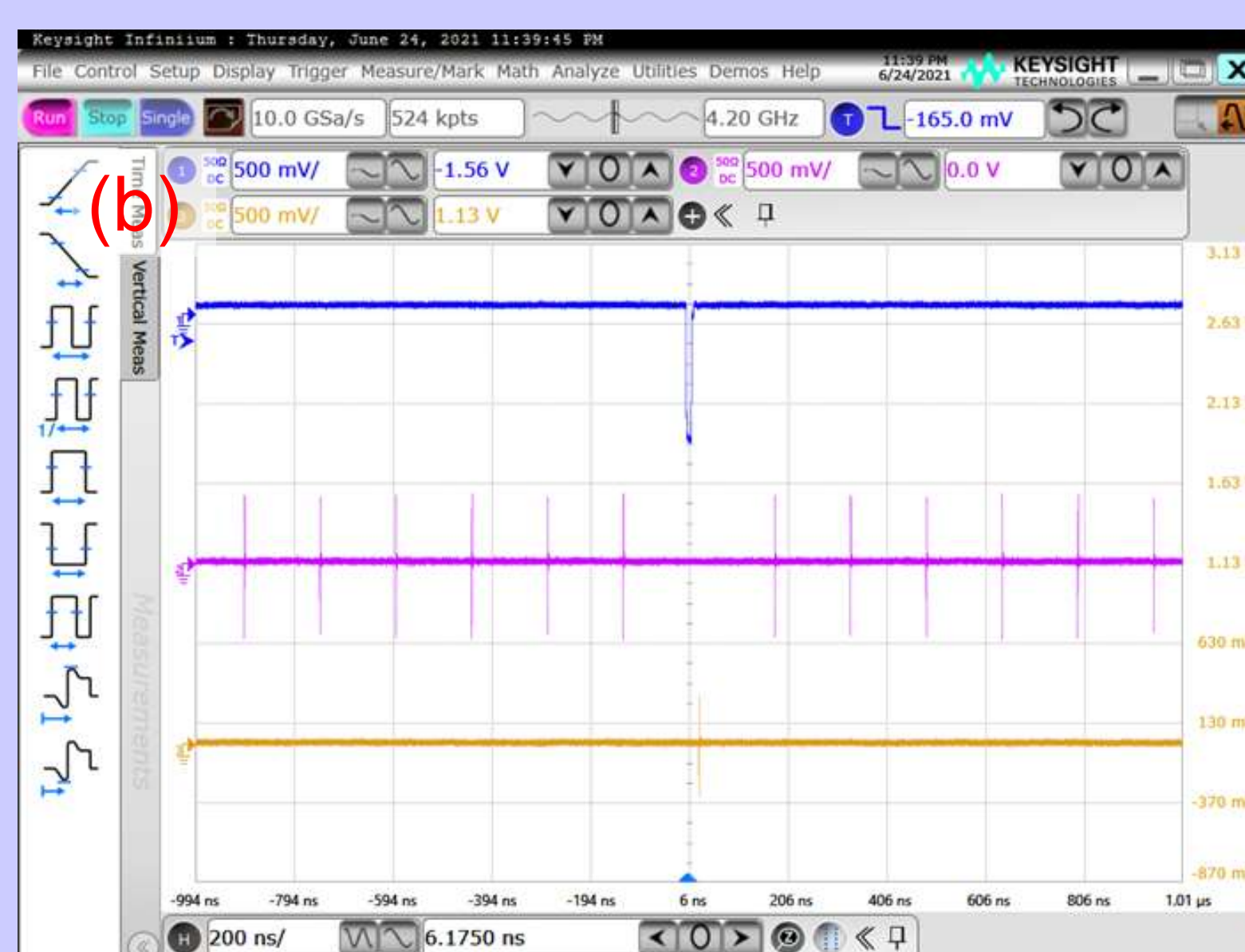
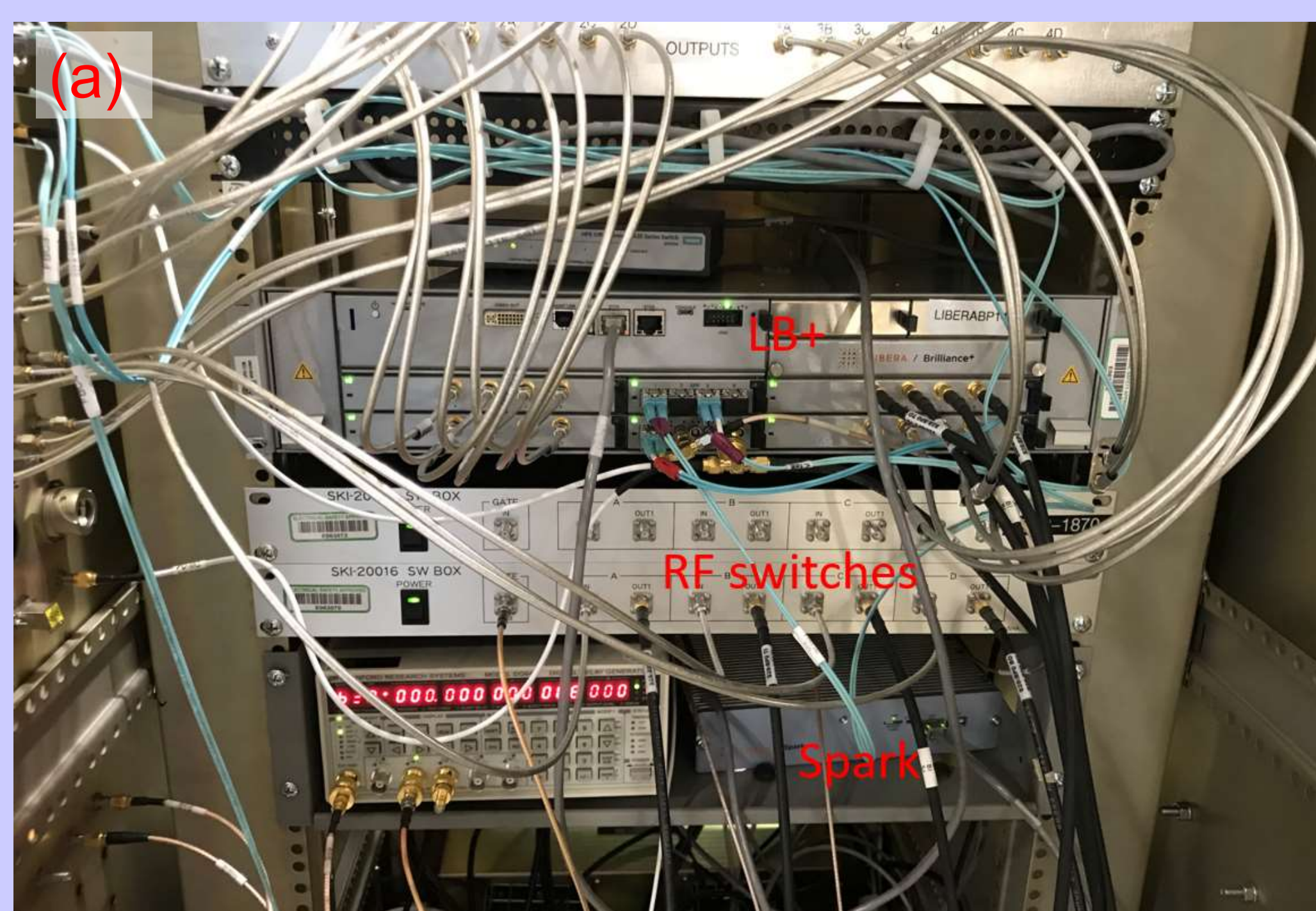


Typical response of the RF switches in time domain. 352 MHz CW signal was connected to the input port at 1 Vpp (+4 dBm). Ch1 (blue) – gate signal applied to the switches, 10 ns width; Ch2 (magenta) – out1 of the switch, this is the output signal outside of the gate; Ch3 (orange) – out2 of the switch, this is the output signal within the 10 ns gate.



Typical measured insertion losses of the RF switches. At 352MHz where BPM electronics work at, the insertion losses are 3.07dB and 4.58dB respectively.

Beam tests at APS



- (a) Beam test setup at S27 of the APS machine
- (b) Button BPM signals of the fast RF switch output.
- (c) Libera Spark TBT resolution (in TDP mode), at various single bunch currents.
- (d) TBT data measured during APS 24-bunch top-up operation. Left side plots are for the gated 1-bunch measured with Spark electronics; right side plots are for the remaining 23 bunches measured by LB+.

