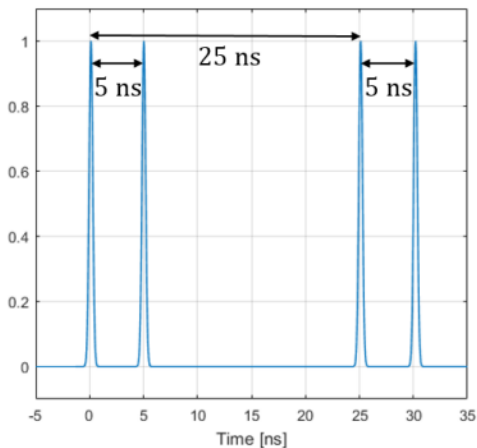
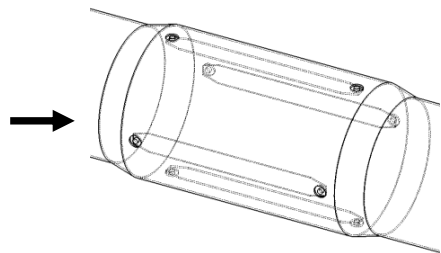


LHC Interlock BPMs upgrade – System overview

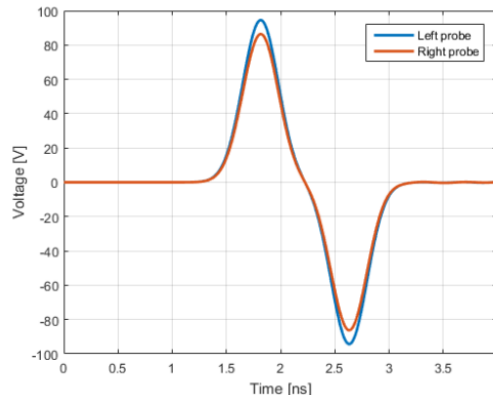
LHC beam (doublet case)



Stripline PU



Single bunch electrode signals

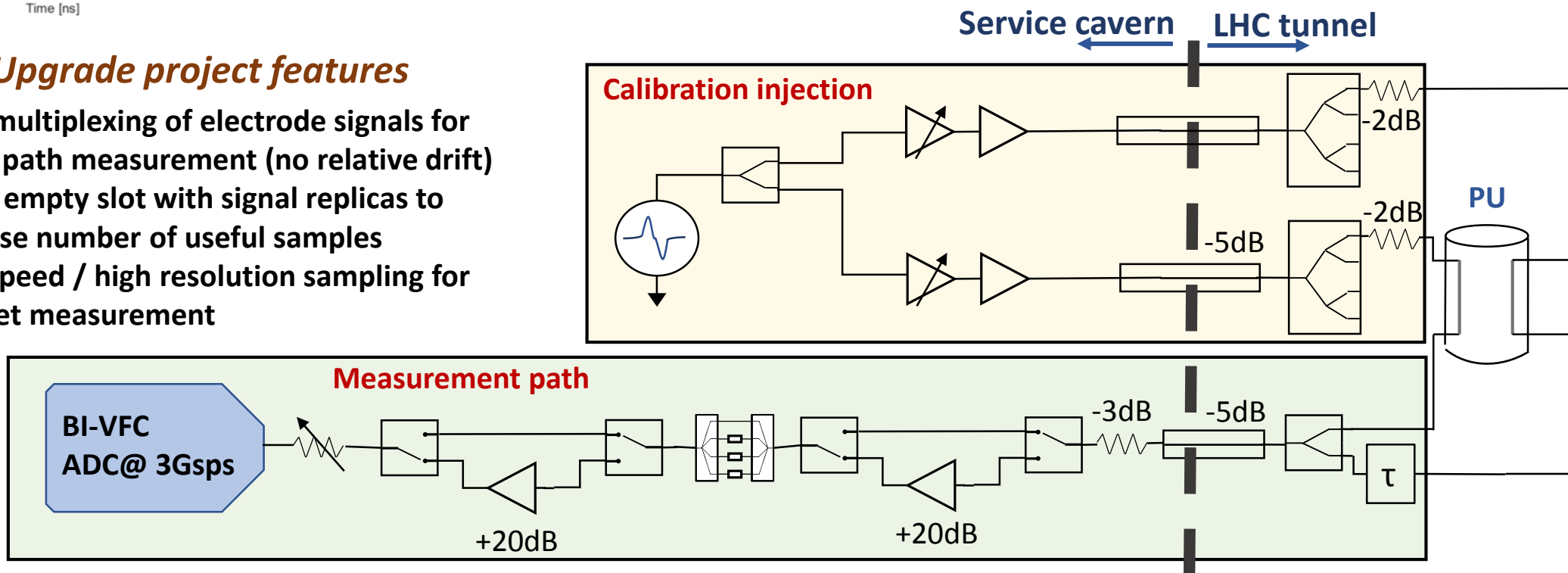


Main system specification

- Safety system (send beam to the dump if out of position)
- > 50dB dynamic range ($1 \cdot 10^9$ to $3 \cdot 10^{11}$ charges per bunch) no gain switching
- Very short pulses
- Protons and ions run compatible

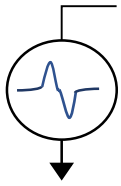
Upgrade project features

- Time multiplexing of electrode signals for single path measurement (no relative drift)
- Filling empty slot with signal replicas to increase number of useful samples
- High speed / high resolution sampling for doublet measurement

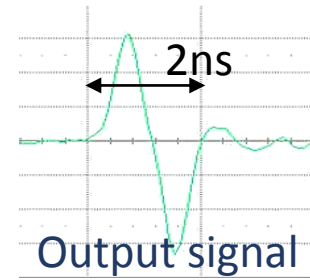


LHC Interlock BPMs upgrade – Custom blocks development

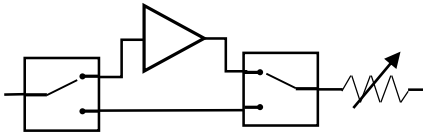
Pulse generator



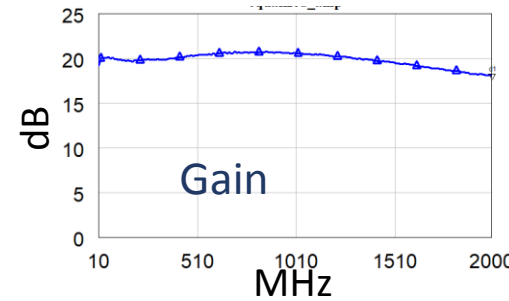
- 2ns long differentiated LHC pulse signal generator



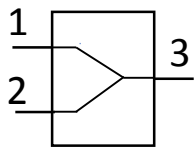
Variable gain stage



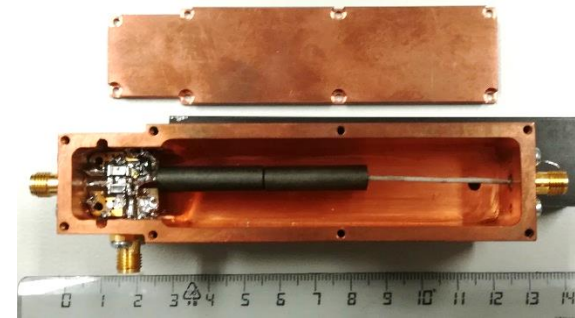
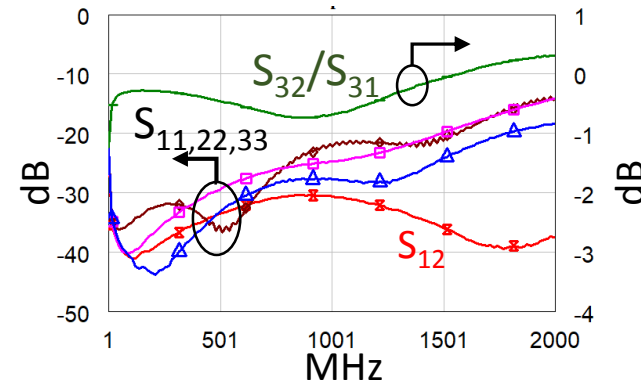
- 2GHz BW
- ~2dB NF
- +30dBm P0.1dB
- 0.5dB attenuation step



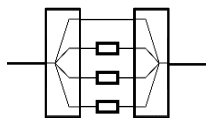
High isolation power combiner



- 10MHz to 1.5GHz
- <-20dB return loss
- >25dB isolation (S12)
- >15W input power



Delay line combiner



- 4x2ns delayed signals
- Minimal ringing

