

# RFQ PA Systems.

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FNAL Proton Source.

30 August 2012

# Outline

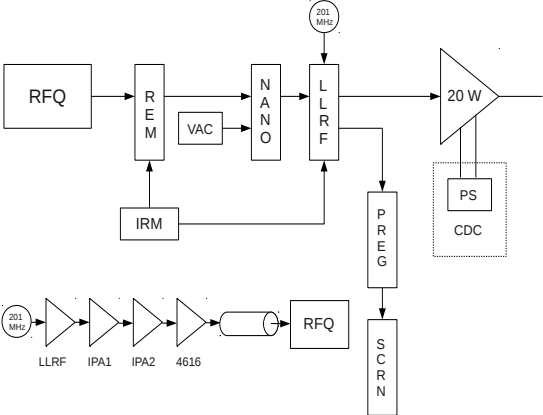
Current system layout.

Operational summary.

Installation details.

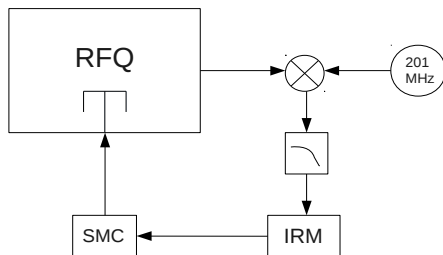
# RFQ Driver PA.

| $T_{width}$   | $P_{peak}$ | $P_{avg}$ | $P_{fwd}$ | $P_{rev}$ | $S_{11}$ | $R_L$   |
|---------------|------------|-----------|-----------|-----------|----------|---------|
| 112 $\mu sec$ | 200 kW     | 330 W     | 160 kW    | 5 kW      | -25 dB   | 14.5 dB |



## RFQ Cavity tuning.

Local application loop to read phase detector, apply logic, and send out cmds to plunger stepper motor. Successfully tested at correction rates of 1 and 5 sec.



## What we've learned.

### Power conditioning procedure.

- Low power CW, 25% of  $P_{\text{avg}}$ , vacuum recovered in  $< 1$  hr in most cases.
- High power pulsed RF, better vacuum helps.
- Overall, system was stable enough for beam studies in  $< 2$  hrs.

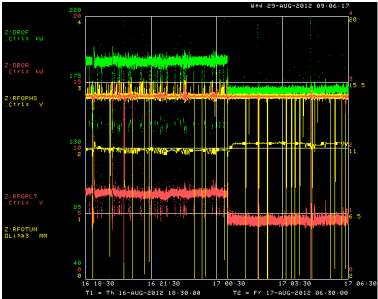
### Cavity tuning.

- Ambient and LCW temperature variations handled by tuning loop.

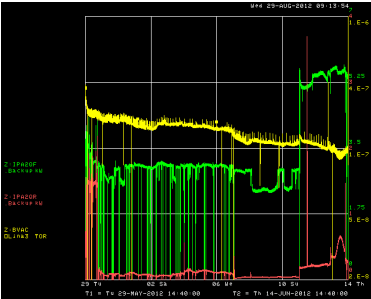
### Driver output

- Very few station trips.
- Output power stable without gradient FB.

# PA output.

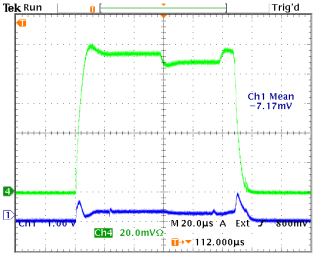


(a) RFQ tuning loop.

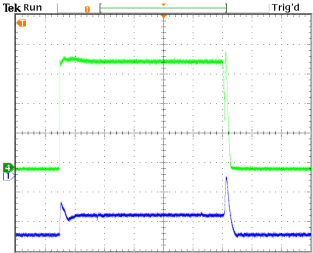


(b) Buncher conditioning.

# Driver output.



(c) Beam.



(d) No beam.

## Installation details.

### RFQ driver station.

- Hang and fix 3.125" t-line length to minimize reflections.
- Split and route 201 MHz ref line from LRF1 vxi.
- Move 4616 anode cabinet to Pre-Acc control room.
- Layout and test interlock & LLRF boards.

### Buncher station.

- Recycle as much of the current system as possible.
- New cavity tuner control loop.
- New stepper motor controller and mechanics.