Status
Thermal Stability
Open Loop Measure-ments
Closed Loop Measure-ments
Summary

LLRF9 Status Update

First AP Results

D. Teytelman

Dimtel, Inc., San Jose, CA, USA

February 11, 2021

Current Status

- In parasitic operation for two weeks;
- Used PAMM on Monday to develop tuner loop controls;
- Progress during the AP on Tuesday:
  - Closed tuner loops, adjusted parameters;
  - Configured klystron drive with extra attenuation to limit maximum power (at 50 kV) to 12 kW;
  - Ran the station in open loop mode, adjusted the two cavity vector combiner;
  - Closed proportional and integral loops;
  - Configured and closed klystron phase loop.
- All existing control loops have been tested at low power.

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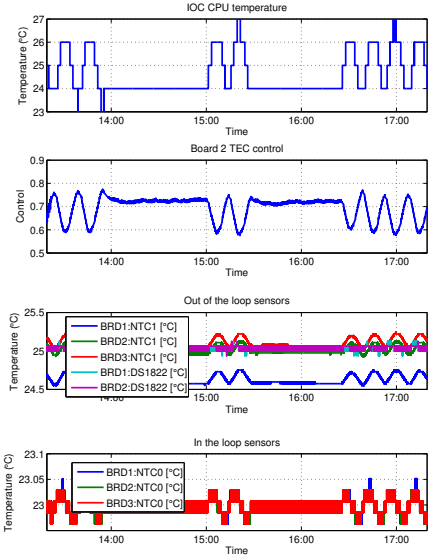

- No external sensor — used coarse CPU temperature monitor;
  - In closed loop stabilization air flow to the CPU is afftected by Peltier dissipation;
  - Went open loop to quantify external temperature variation.
- After turning on the loops;
- External temperature swing is 2 °C, out of the loop sensors vary by 0.2 °C, in the loop sensors — 0.1 °C;
- Full stripchart.

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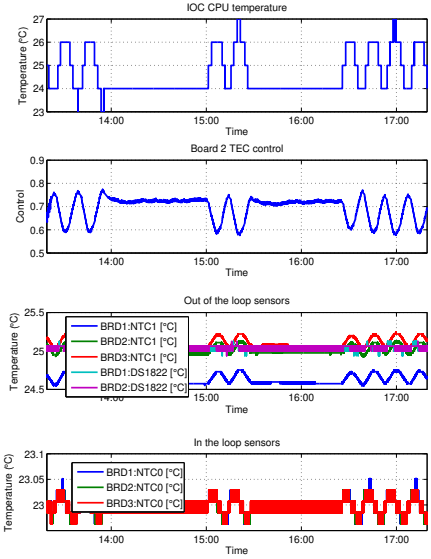

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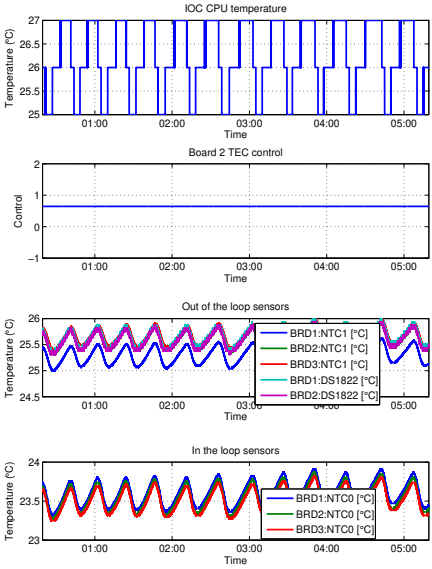

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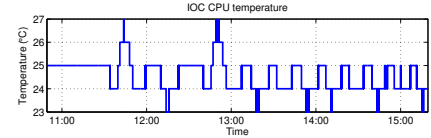

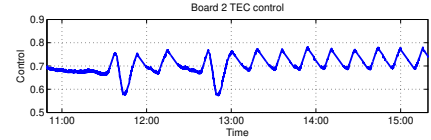

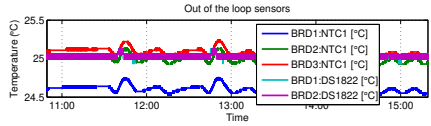

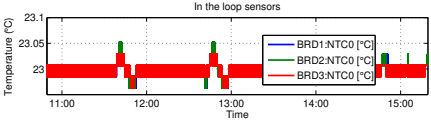

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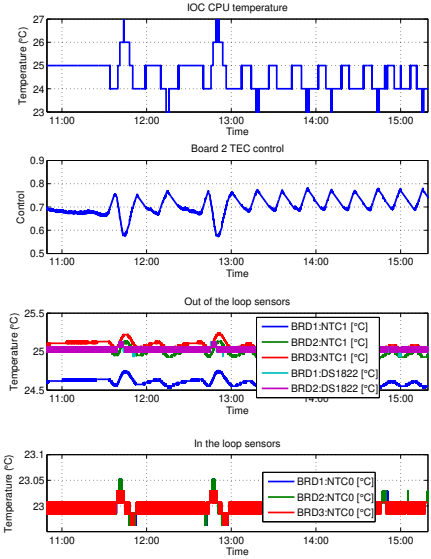

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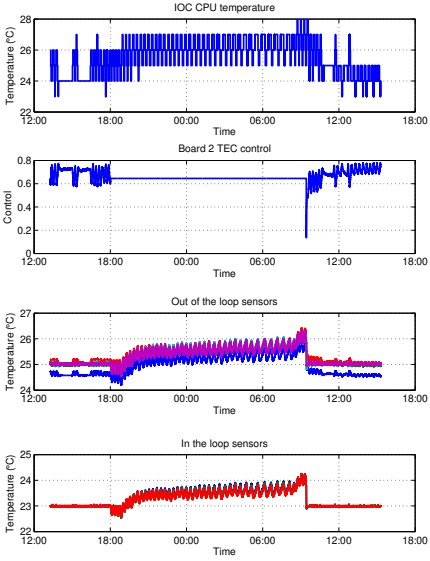

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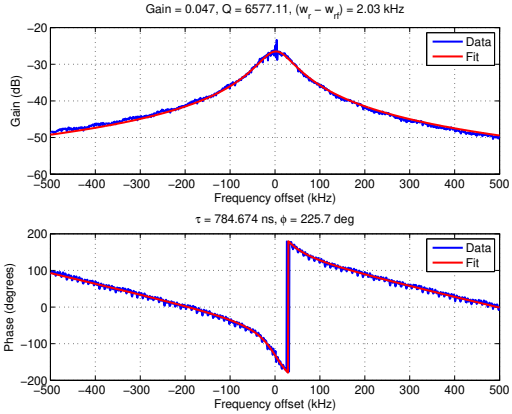

- Cavity 1;
- Cavity 2;
- Cavity 3;
- Cavity 4;
- Loaded Q ranges from 6300 (cavity 2) to 6800 (cavity 4);
- Delay ranges from 785 ns (cavity 1) to 808 ns (cavity 4).

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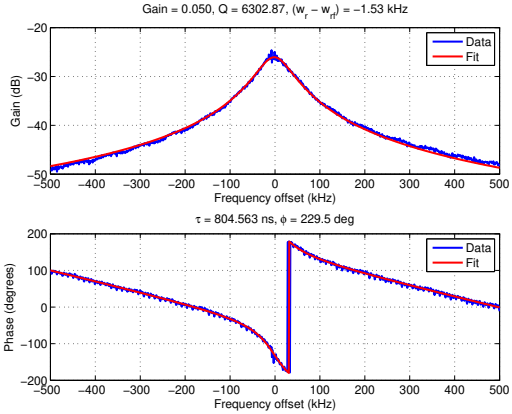

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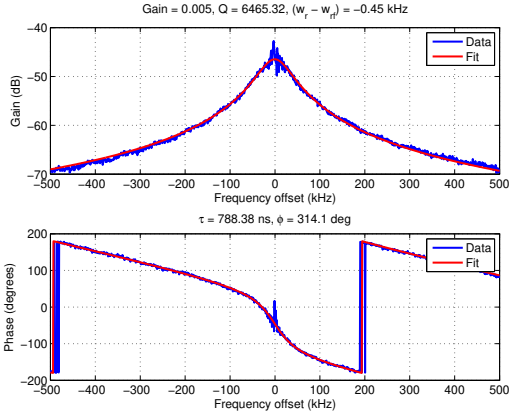

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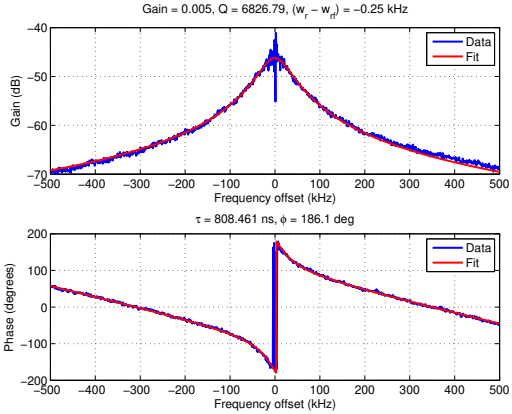

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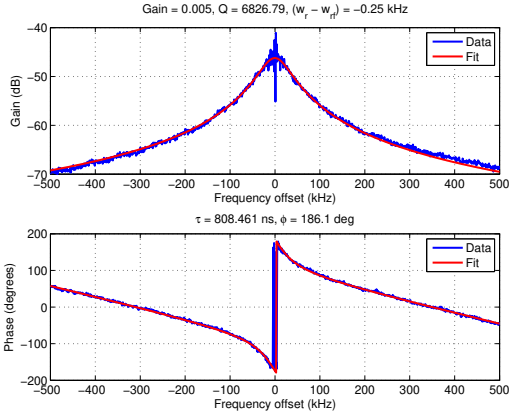

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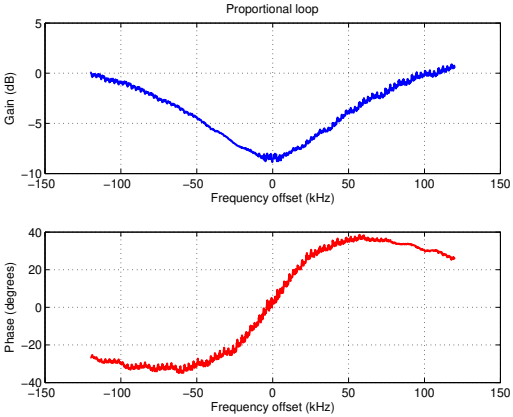

- Response from the setpoint to the error signal;
- Reflects closed-loop rejection of perturbations;
- Proportional loop;
- Proportional and integral;
- Same data vs. the offset frequency from the RF;
- 23 dB at 720 Hz, 17 dB at 1440 Hz.

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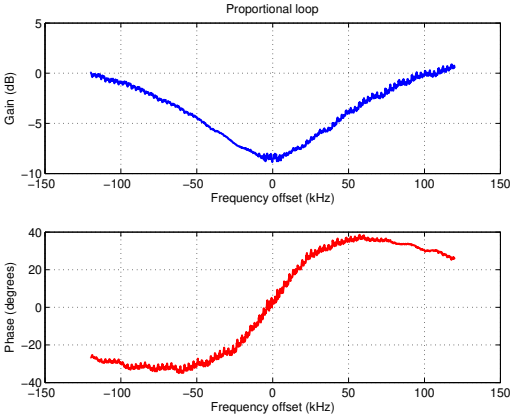

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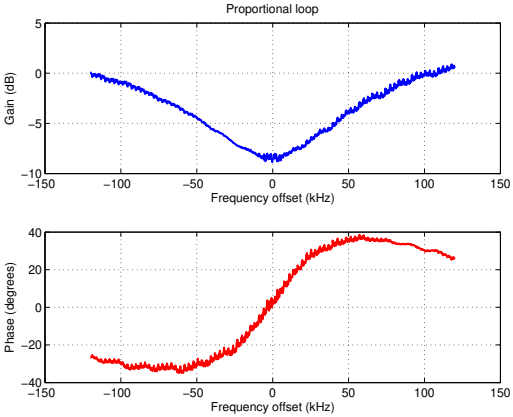

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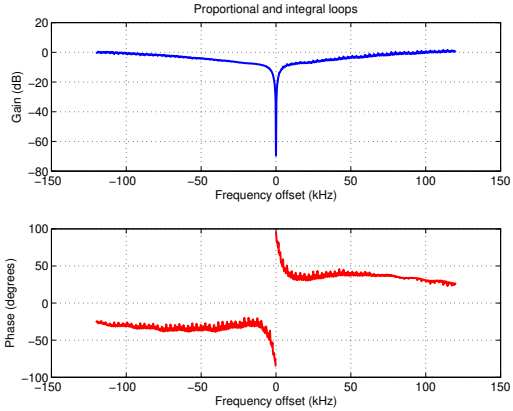

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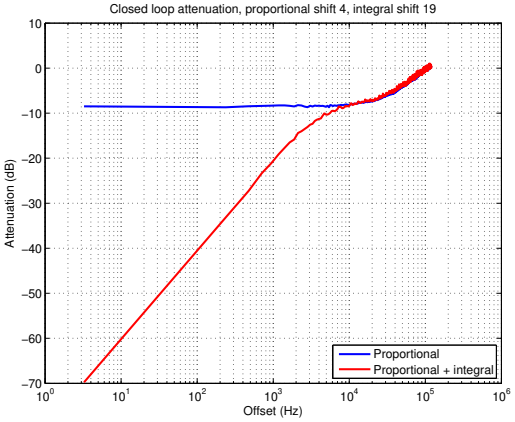

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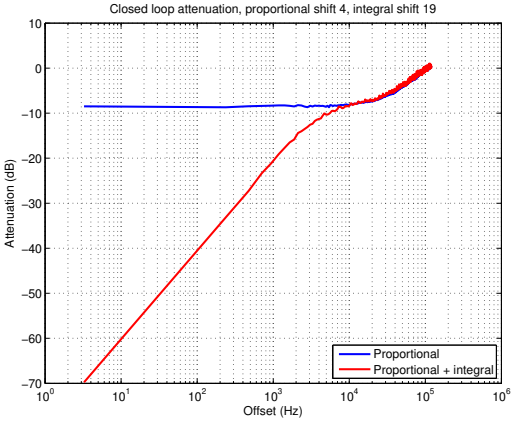

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- Fairly smooth progress so far;
- Nearly ready to run at the full cavity field and with beam;
- TODO:
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