AFE characterization

Antoine

CBPM meeting: June 23, 2023

Previously

Previously: 10 pF capacitors (C146, C147 forming voltage divider) removed

- ✗ factor ~2 amplification expected
- ✗ beam characterization on Tuesday May 9: instr elog 2115

Previously: 33 ohms R134 resistor replaced by 0 ohm resistor

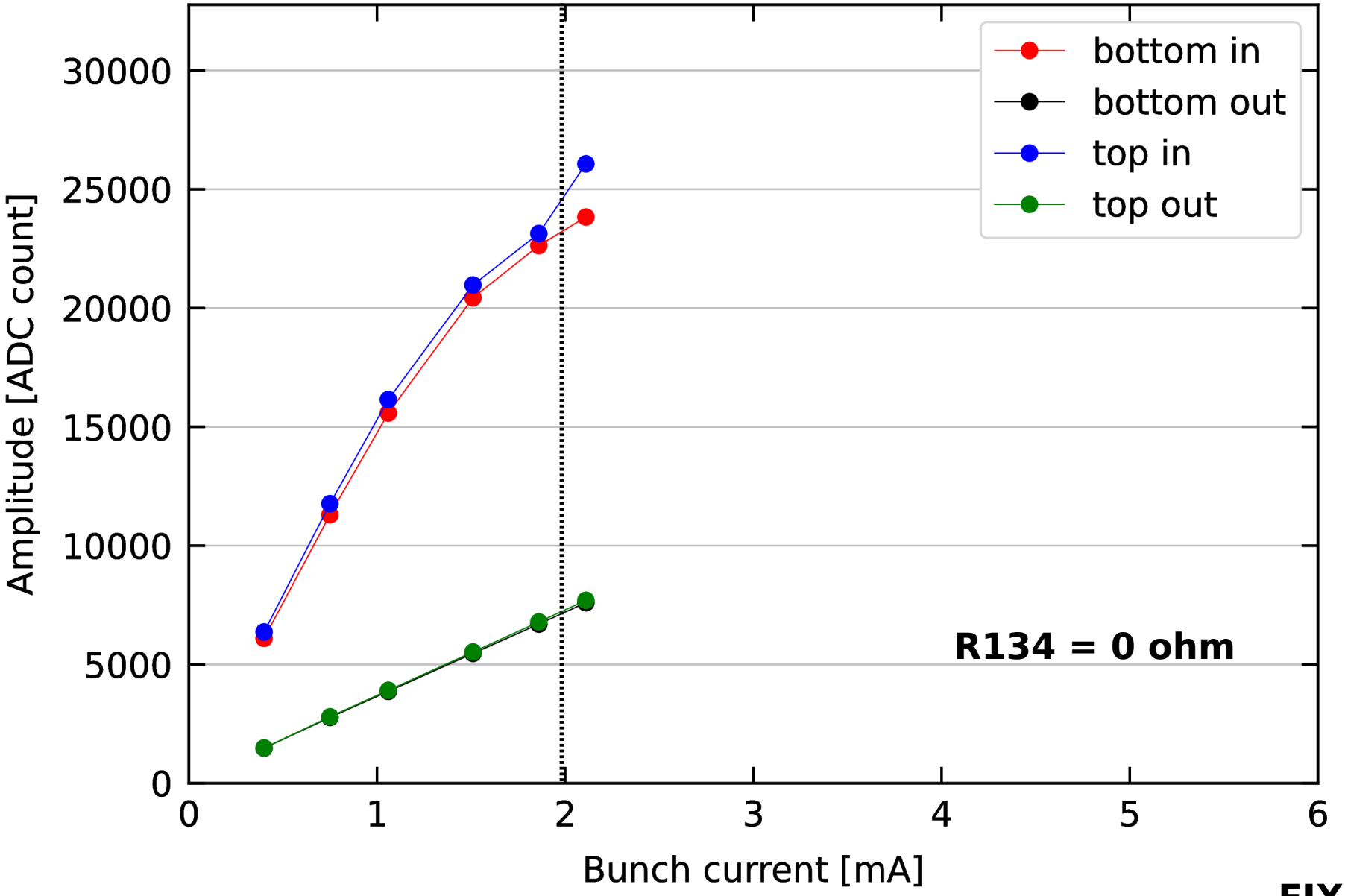
- ✗ beam characterization on Tuesday May 16: instr elog 2119

Previously:

- ✗ TOP IN card has R134 set to 10 ohm
- ✗ BOT IN card has added capacitors to “make the filter into two pi sections instead of a singe T section”, R134 set to 0 ohm
- ✗ beam characterization on Tuesday May 23: instr elog 2124

Amplitude vs bunch current

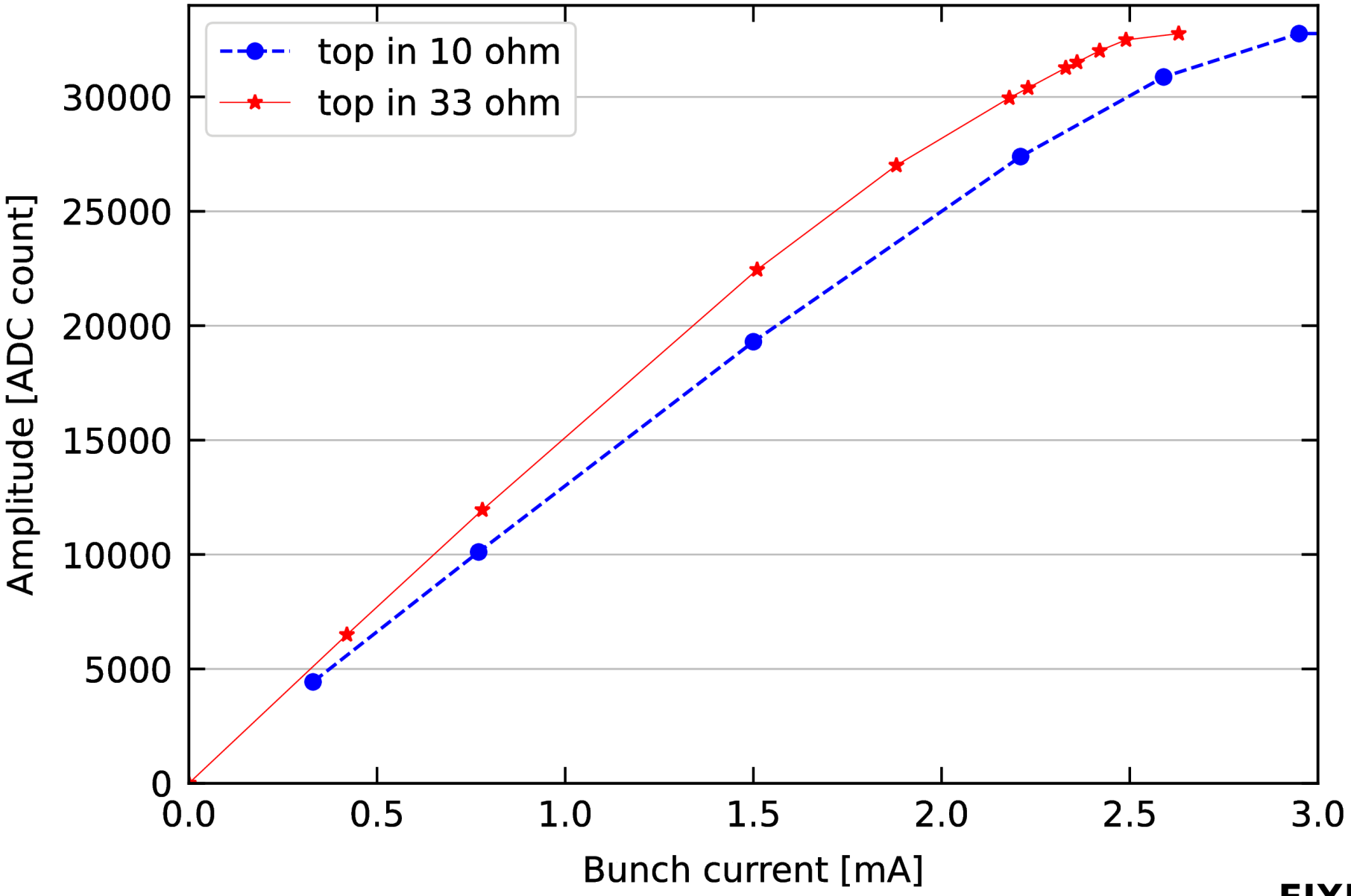
12W (ctactf133), peak-aligned at each current step – Tuesday **5/16**



FIXED GAIN

Amplitude vs bunch current

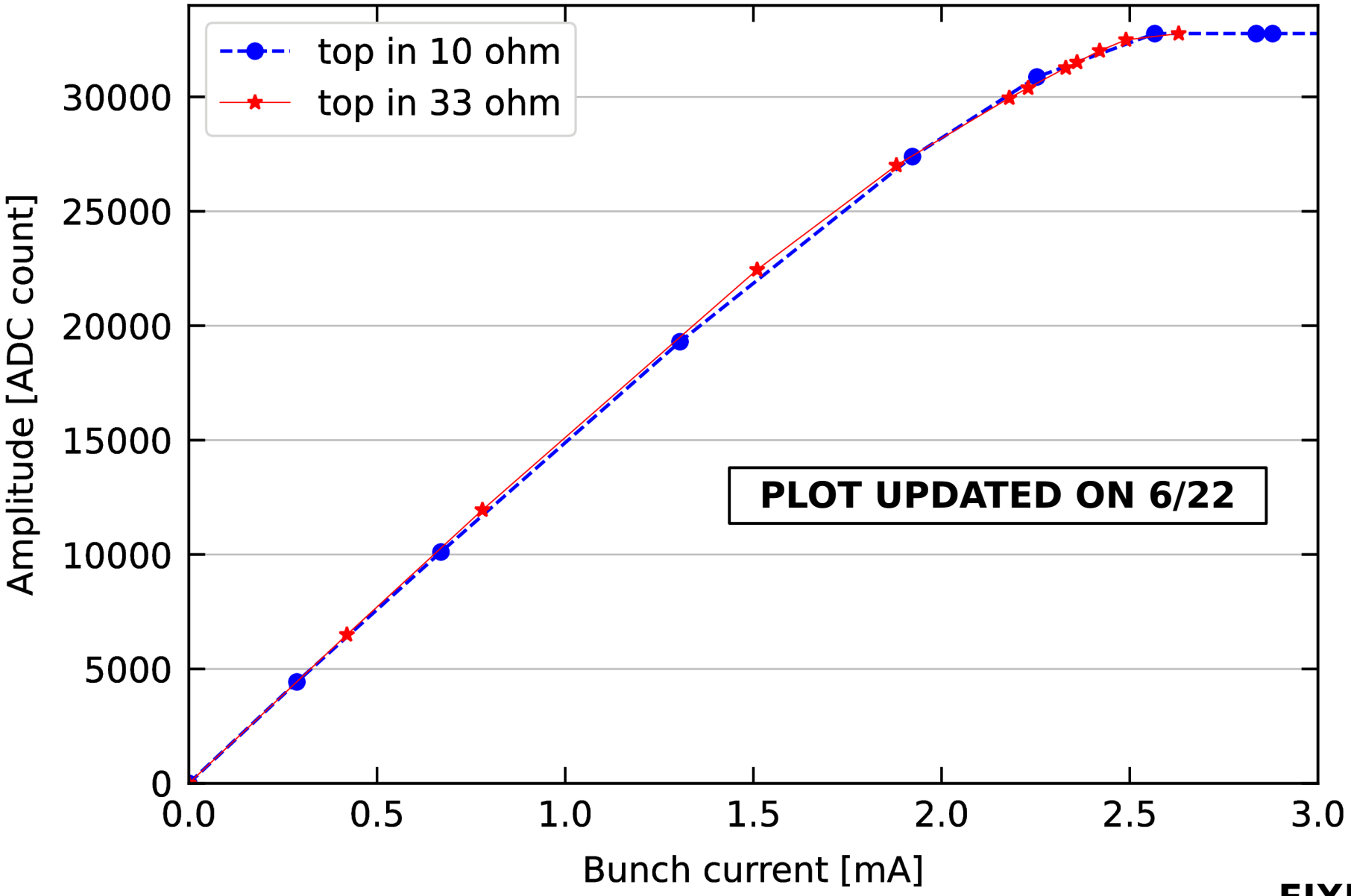
10 ohm (**5/23**) vs 33 ohm (**5/9**) – **same card** being used



FIXED GAIN

Amplitude vs bunch current

10 ohm gain scaled to match 33 ohm at low current



FIXED GAIN

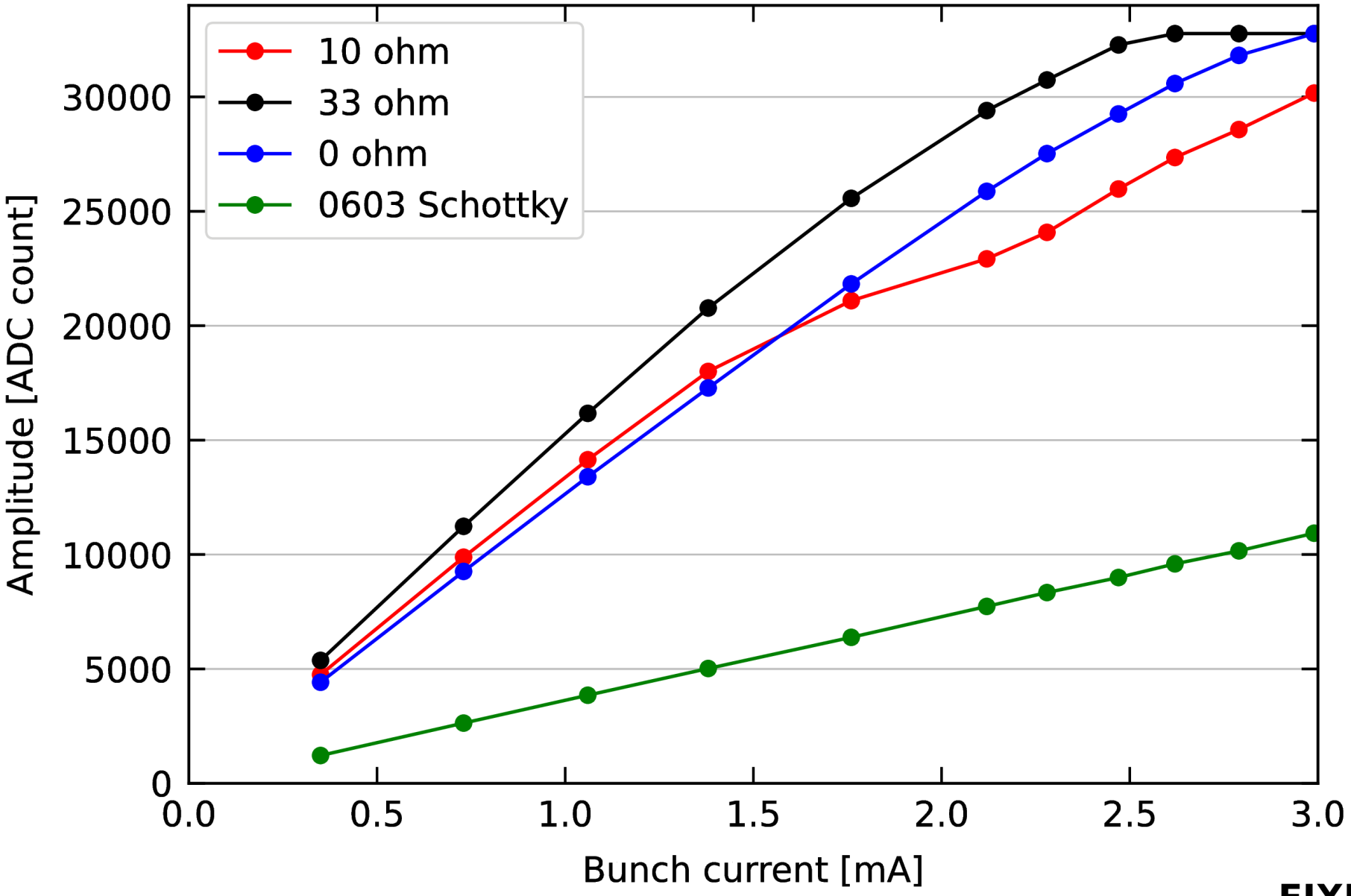
Where we are at

Now: all the cards with new Murata inductor on top of previous mods and

- ✗ BOT IN: R134 = 10 Ω
- ✗ BOT OUT: R134 = 33 Ω (**hiccup**: not the planned 10 Ω + 5 pF filter config.)
- ✗ TOP IN: R134 = 0 Ω
- ✗ TOP OUT: R134 = 10 Ω, 0603 Schottky diode (fixed gain amplifier removed)
- ✗ beam characterization on Tuesday June 20: instr elog 2136

Amplitude vs bunch current

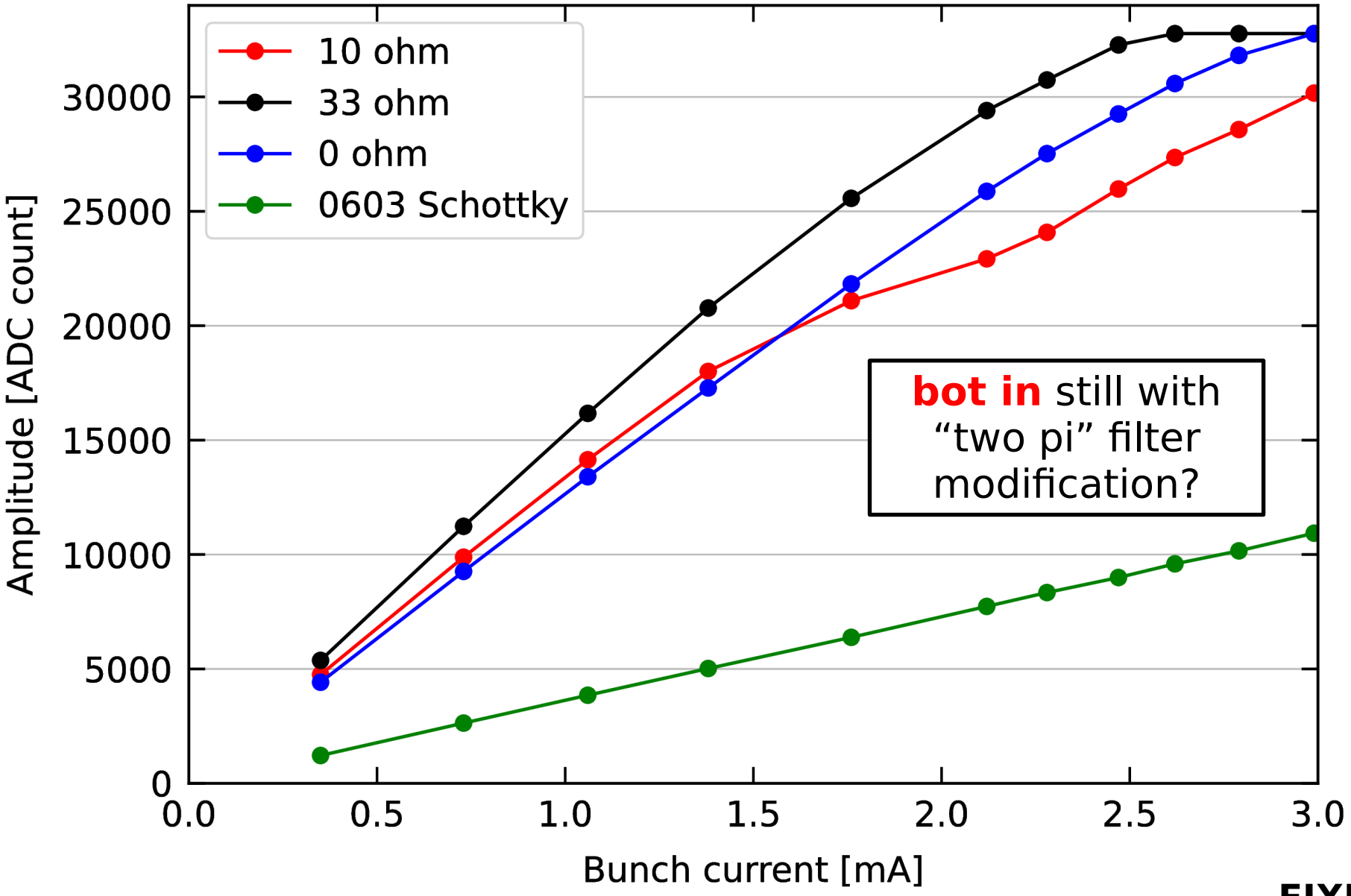
12W (ctactf133), peak-aligned at each current step – Tuesday **6/20**



FIXED GAIN

Amplitude vs bunch current

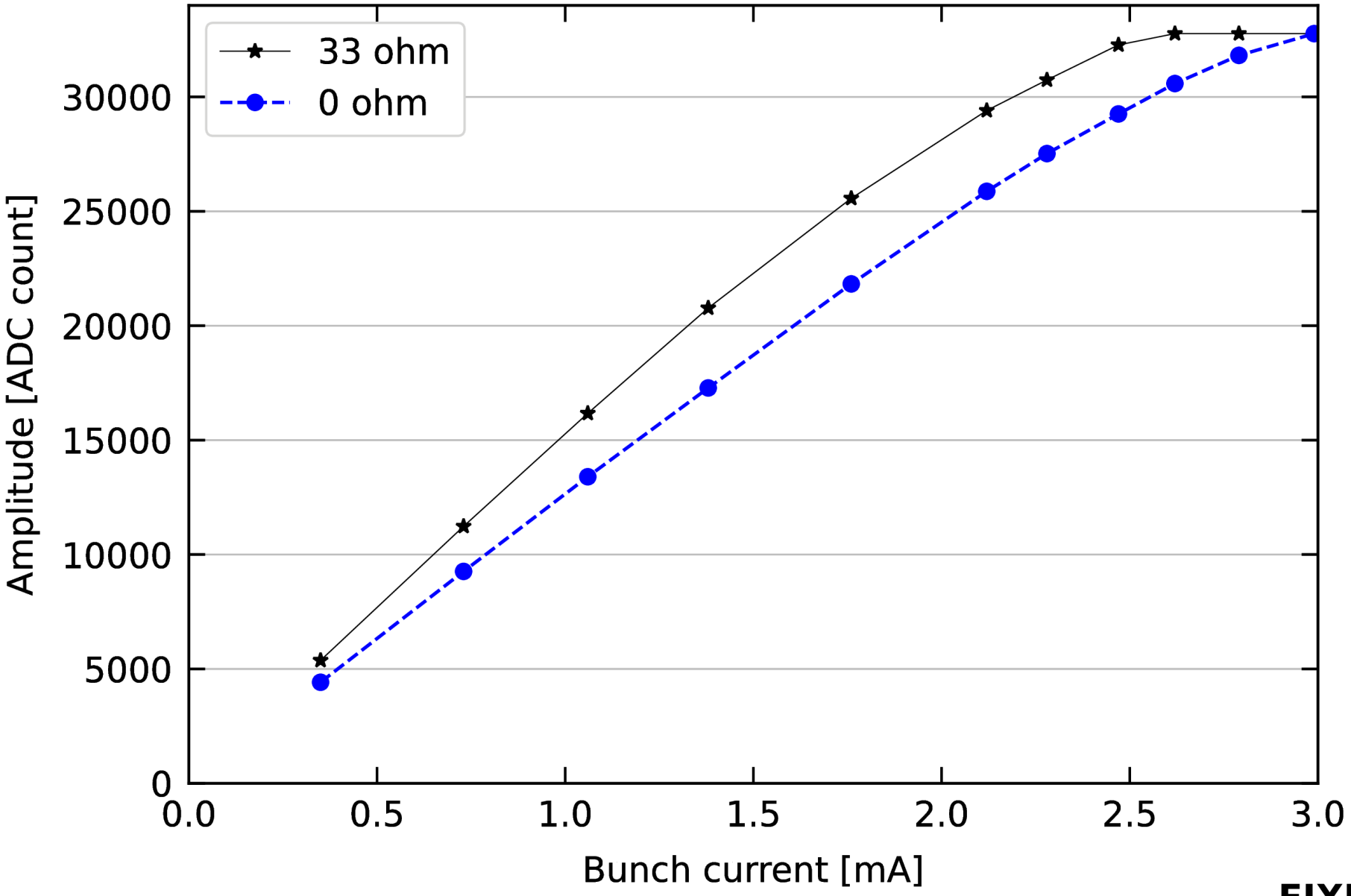
12W (ctactf133), peak-aligned at each current step – Tuesday **6/20**



FIXED GAIN

Amplitude vs bunch current

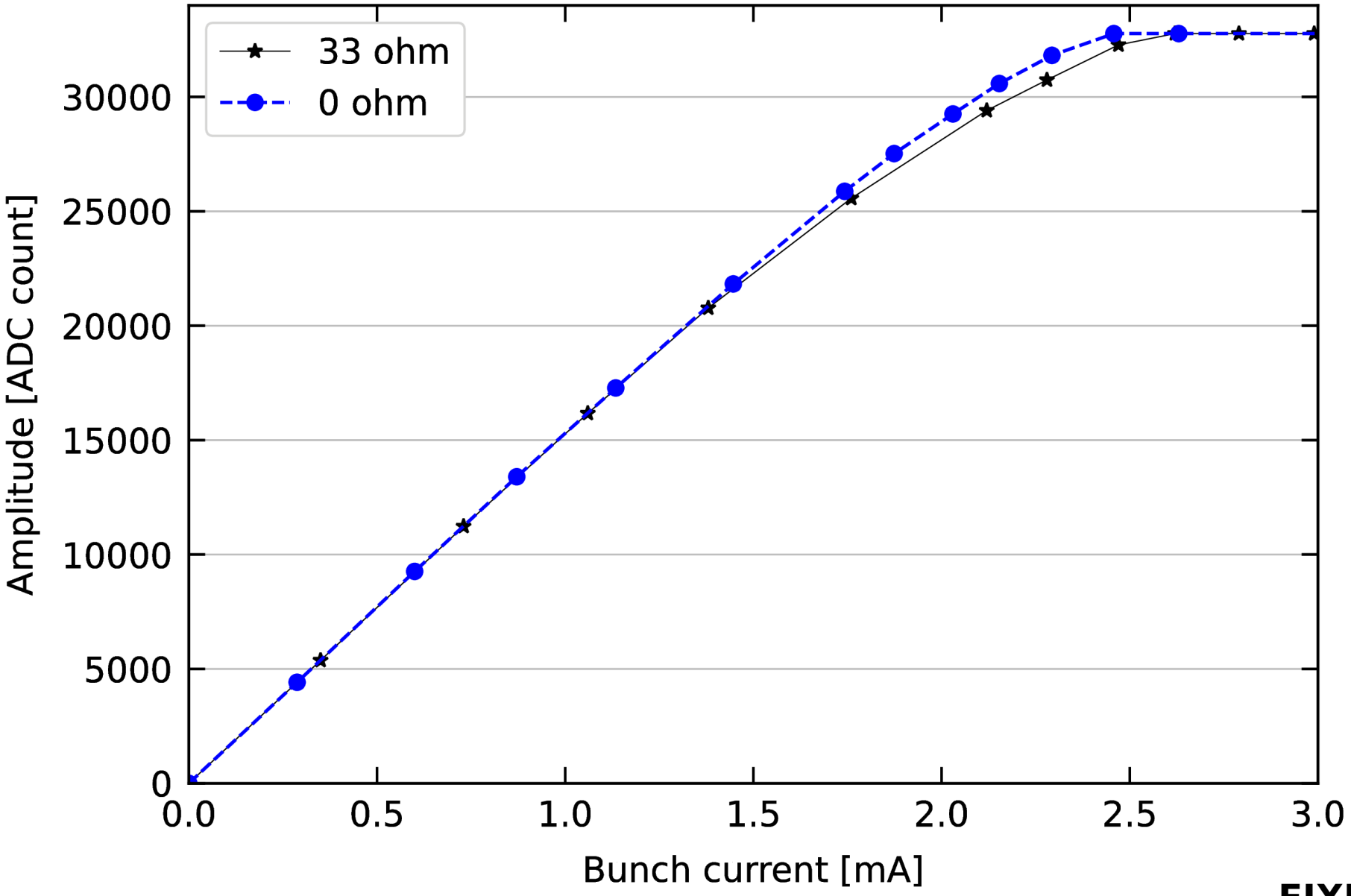
12W (ctactf133), peak-aligned at each current step – Tuesday **6/20**



FIXED GAIN

Amplitude vs bunch current

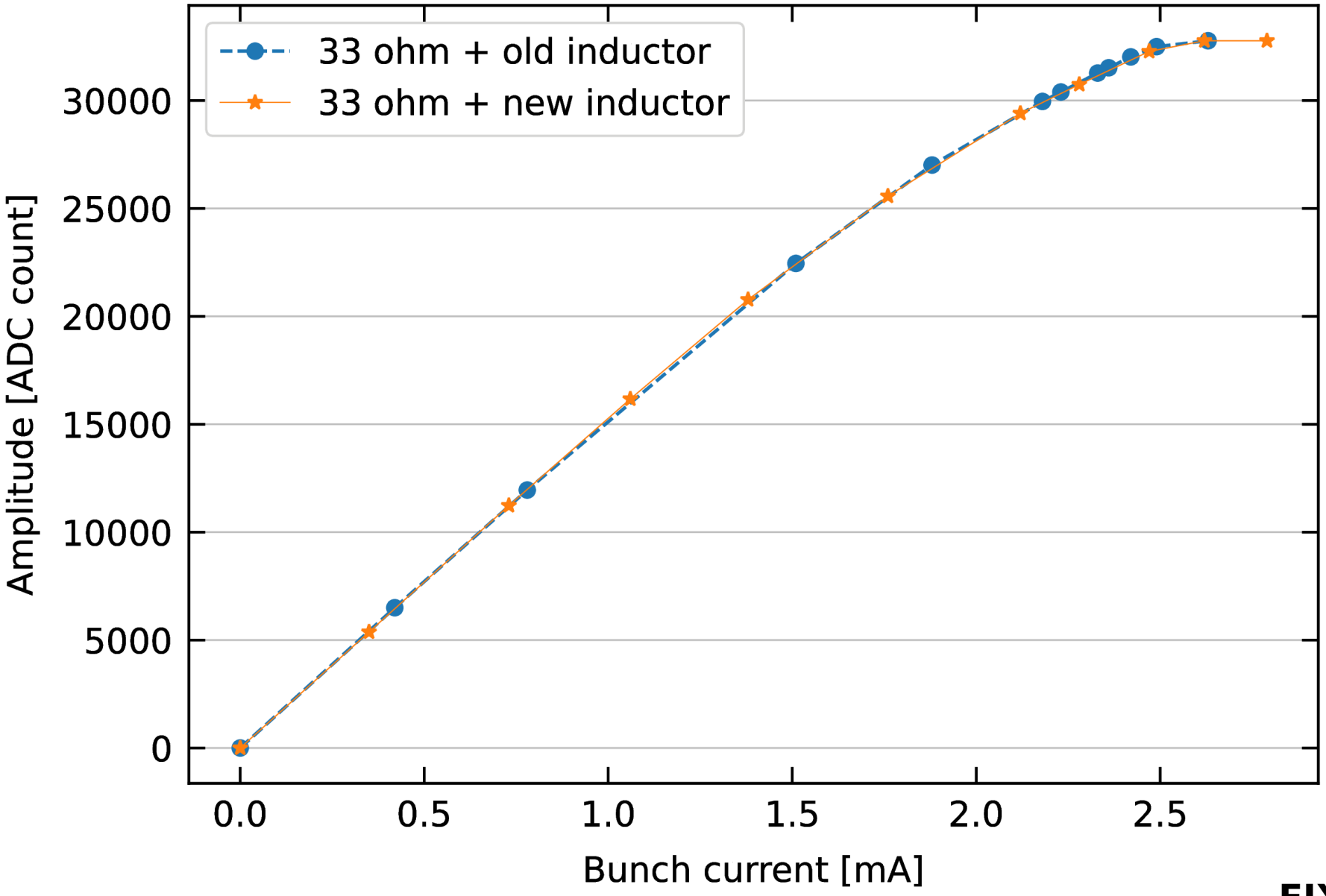
0 ohm gain scaled to match 33 ohm at low current – **different cards!**



FIXED GAIN

Amplitude vs bunch current

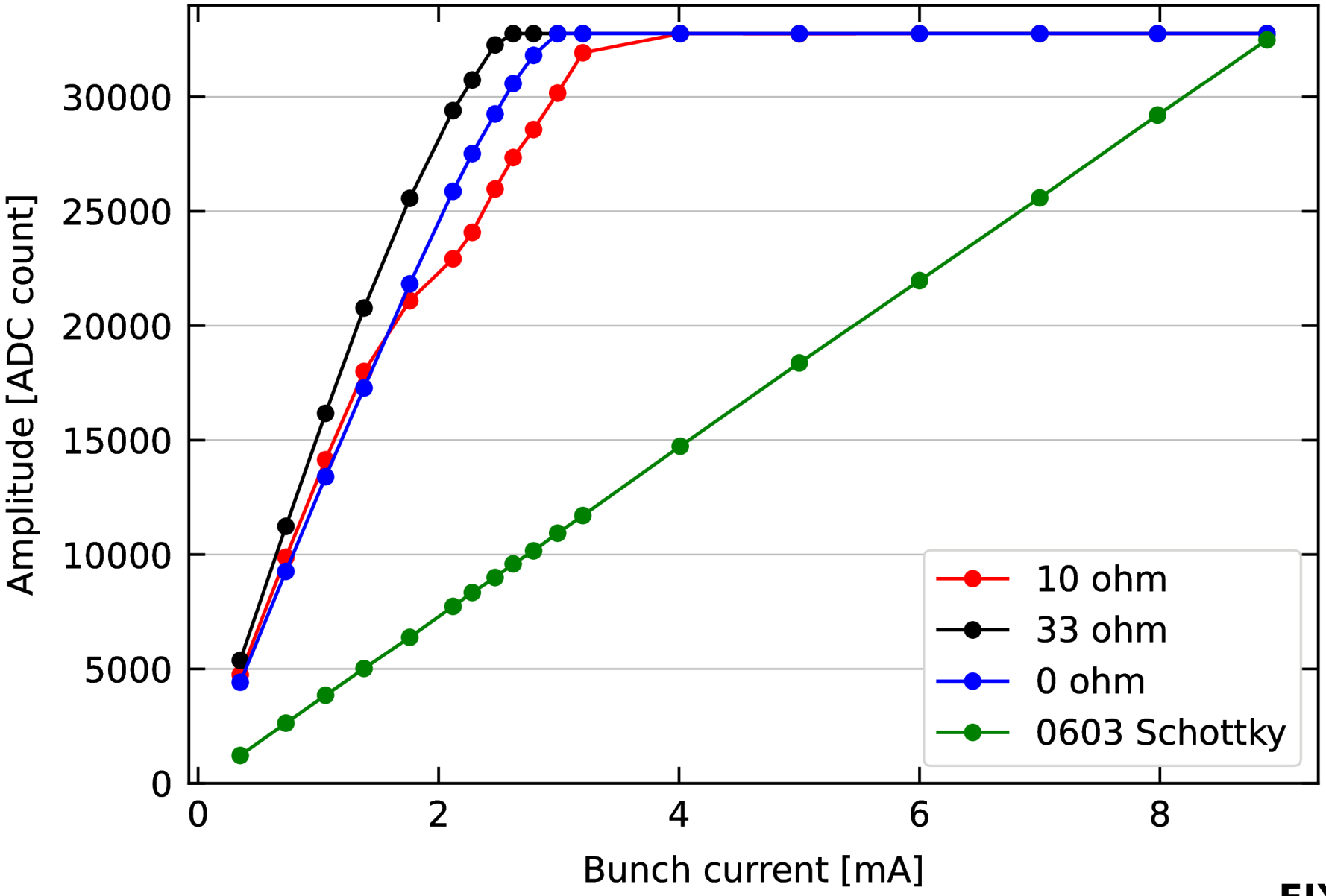
33 ohm old (**5/9**) vs new inductor (**6/20**) – **different cards!**



FIXED GAIN

Amplitude vs bunch current

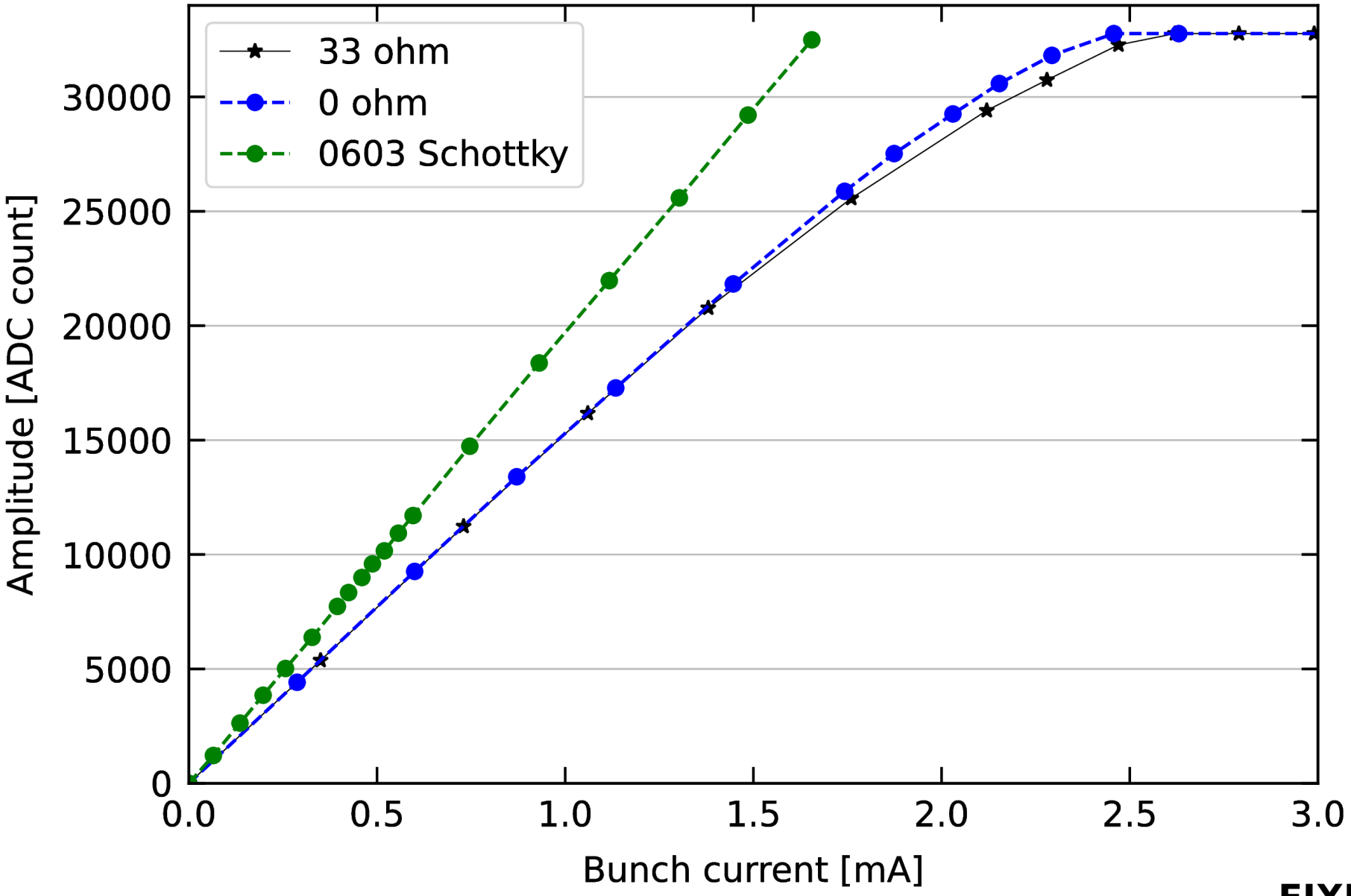
12W (ctactf133), peak-aligned at each current step – Tuesday **6/20**



FIXED GAIN

Amplitude vs bunch current

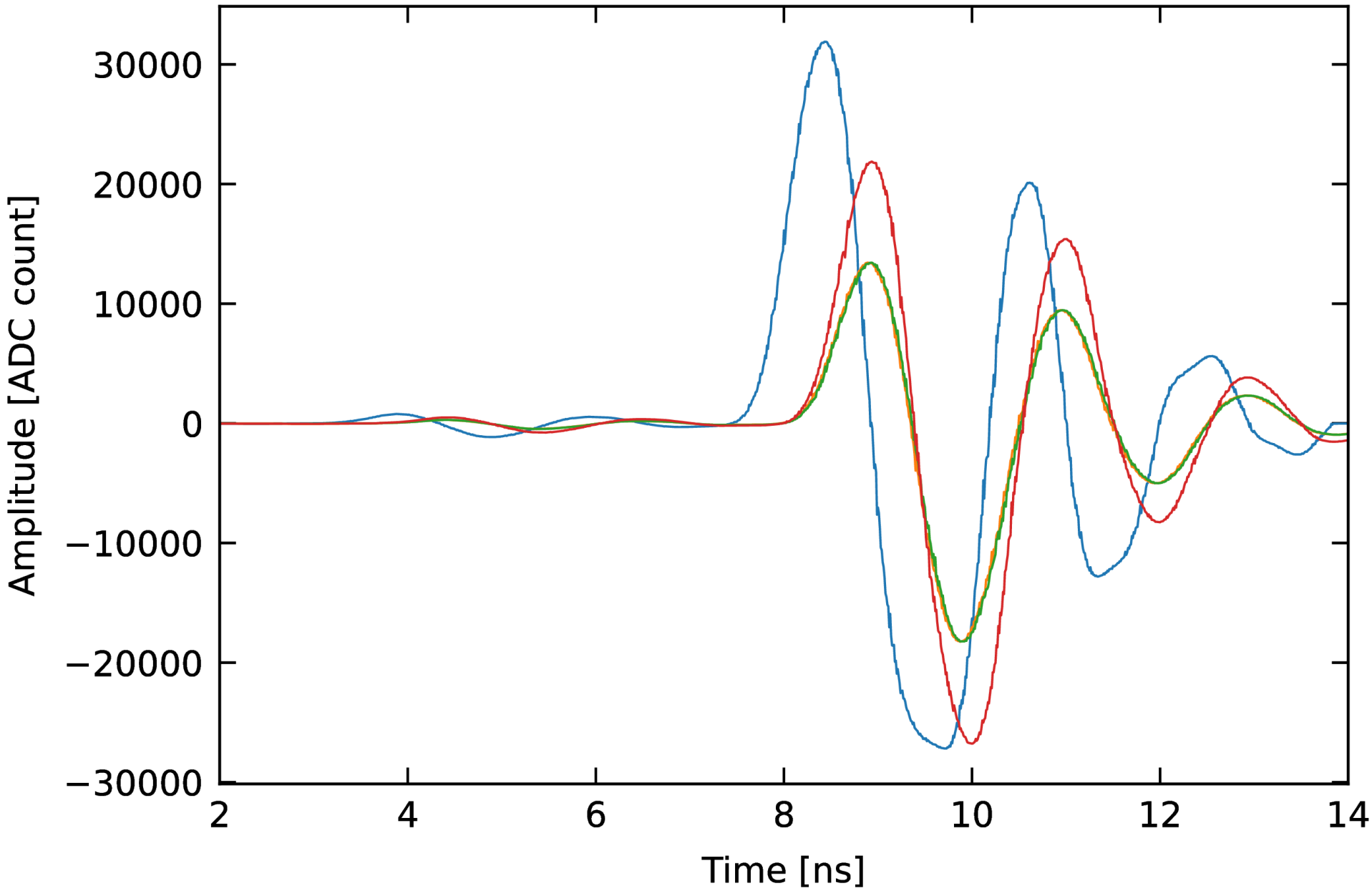
0 ohm and Schottky gains scaled to match 33 ohm at low current



FIXED GAIN

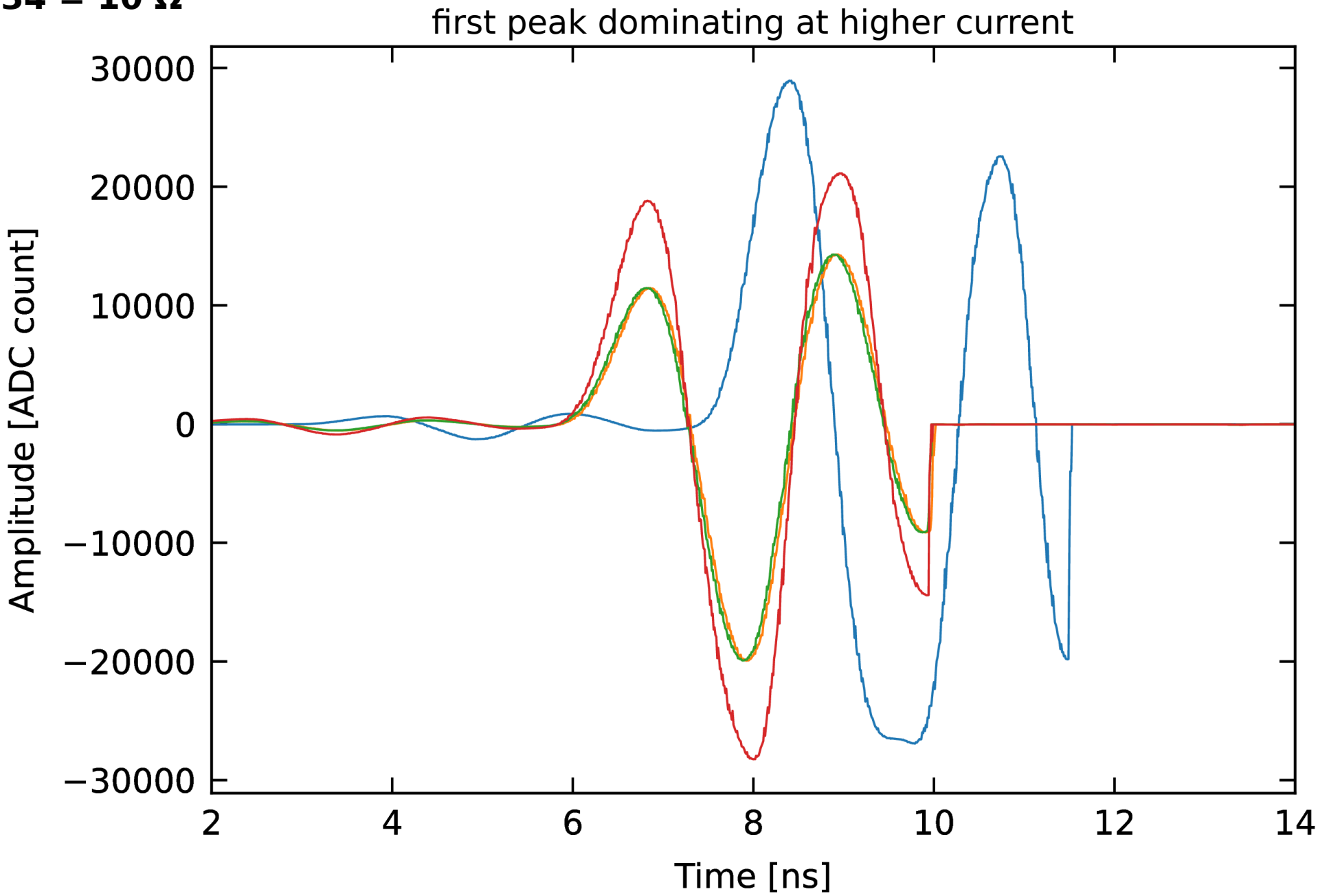
Some waveforms

R134 = 0 Ω



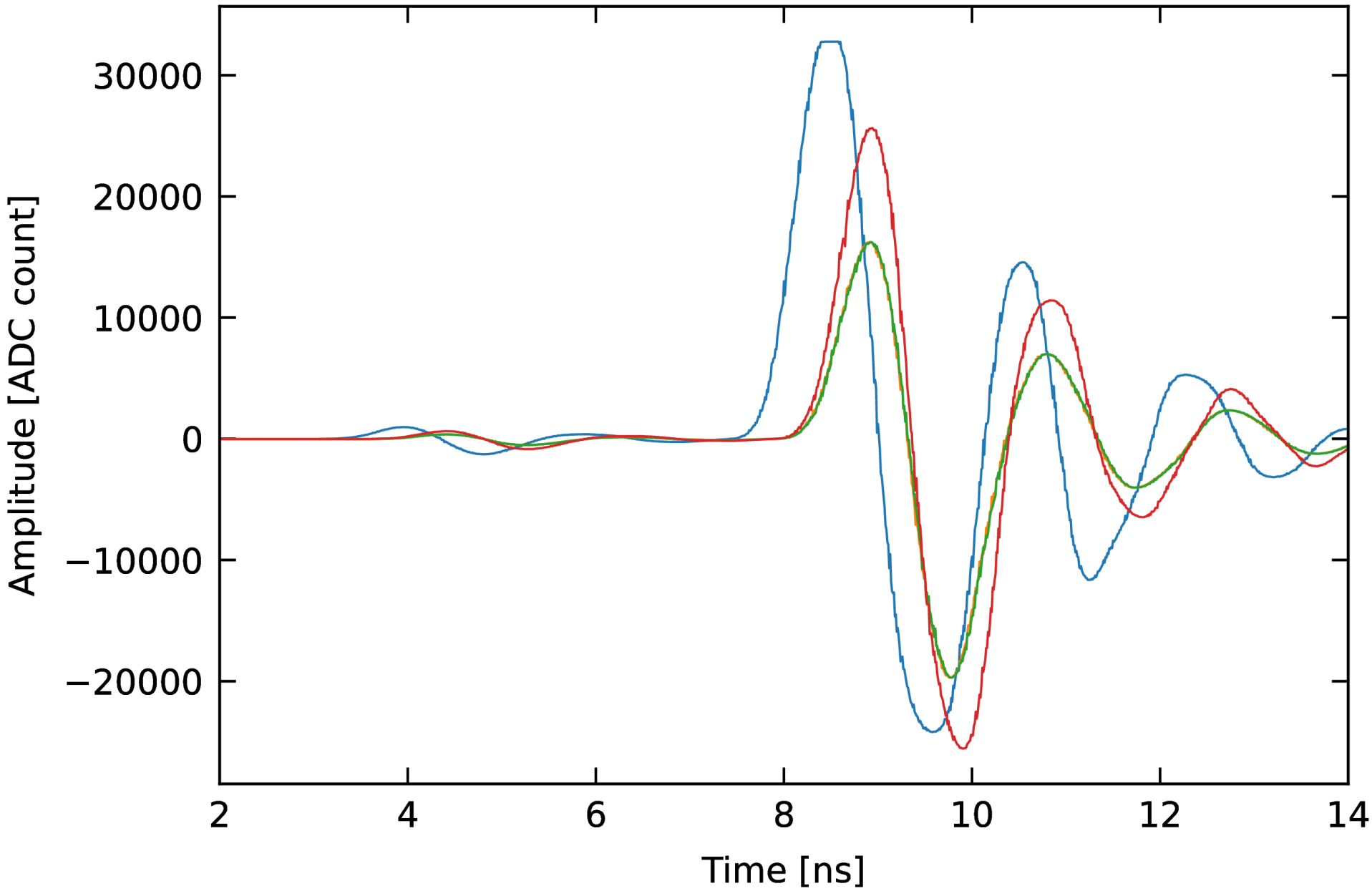
Some waveforms

R134 = 10 Ω



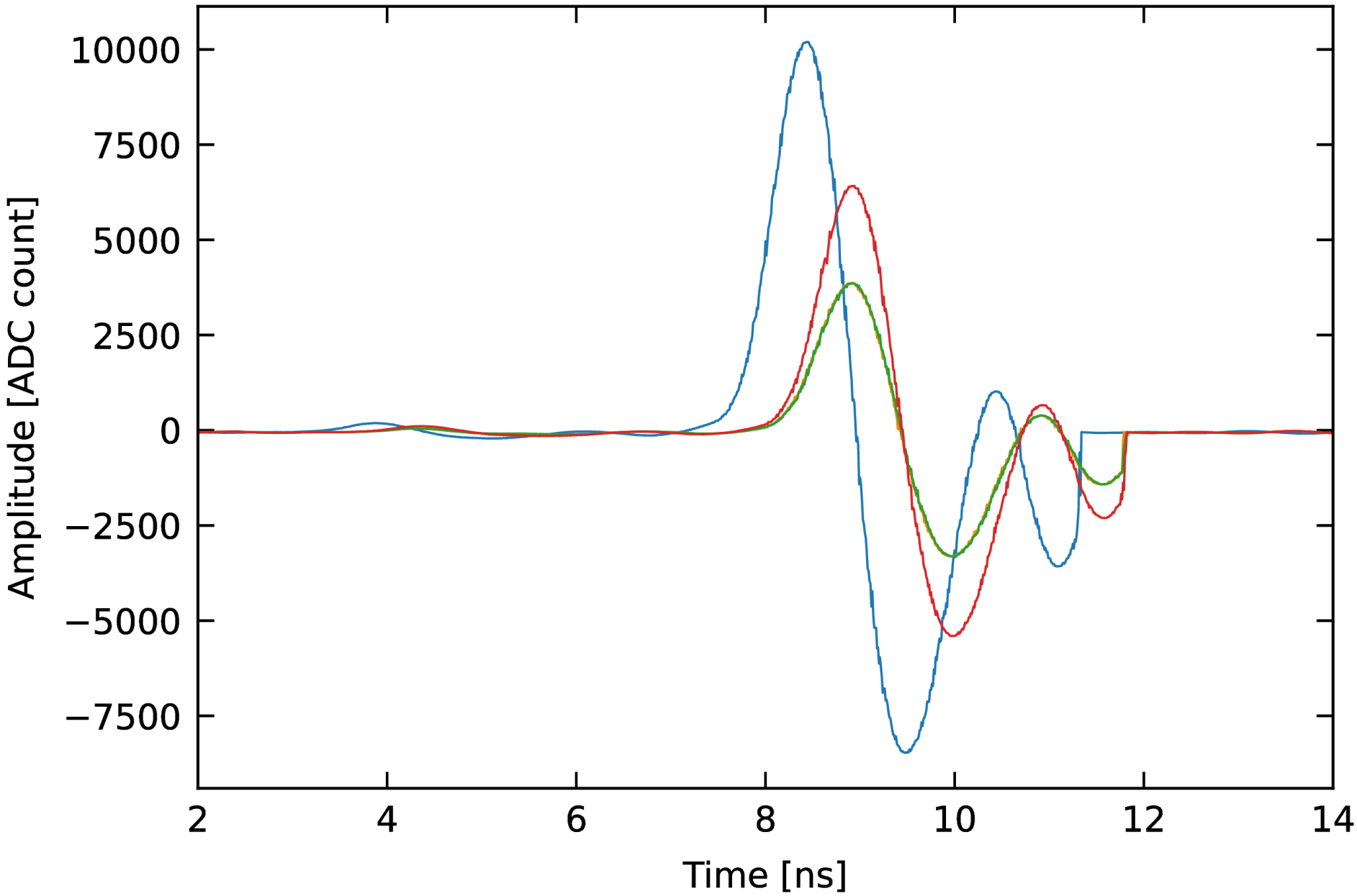
Some waveforms

R134 = 33 Ω

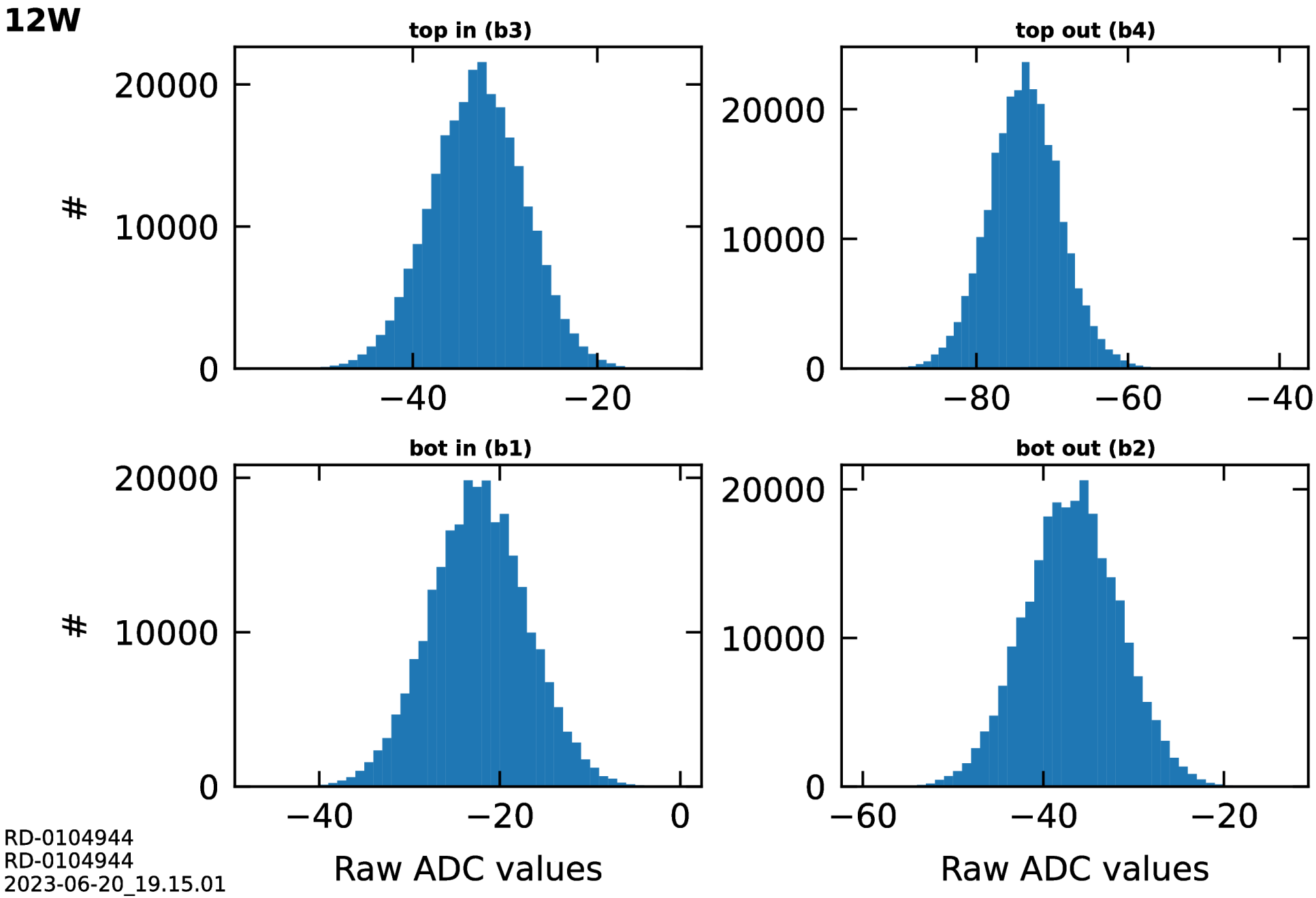


Some waveforms

R134 = 10 Ω + Schottky



RMS noise


12W
top in (b3)
top out (b4)
bot in (b1)
bot out (b2)
#
20000
10000
0
−40
−20
−80
−60
−40
−60
−40
−20
0
Raw ADC values
Raw ADC values
RD-0104944
RD-0104944
2023-06-20_19.15.01

RMS noise

BOT IN: 5.41 ADU

BOT OUT: 5.26 ADU

TOP IN: 5.07 ADU

TOP OUT: 4.75 ADU (Shottky diode)

Notes

5/9 vs 5/23:

- ✗ linearity very similar for R134 10 vs 33 ohm when using same card

5/16:

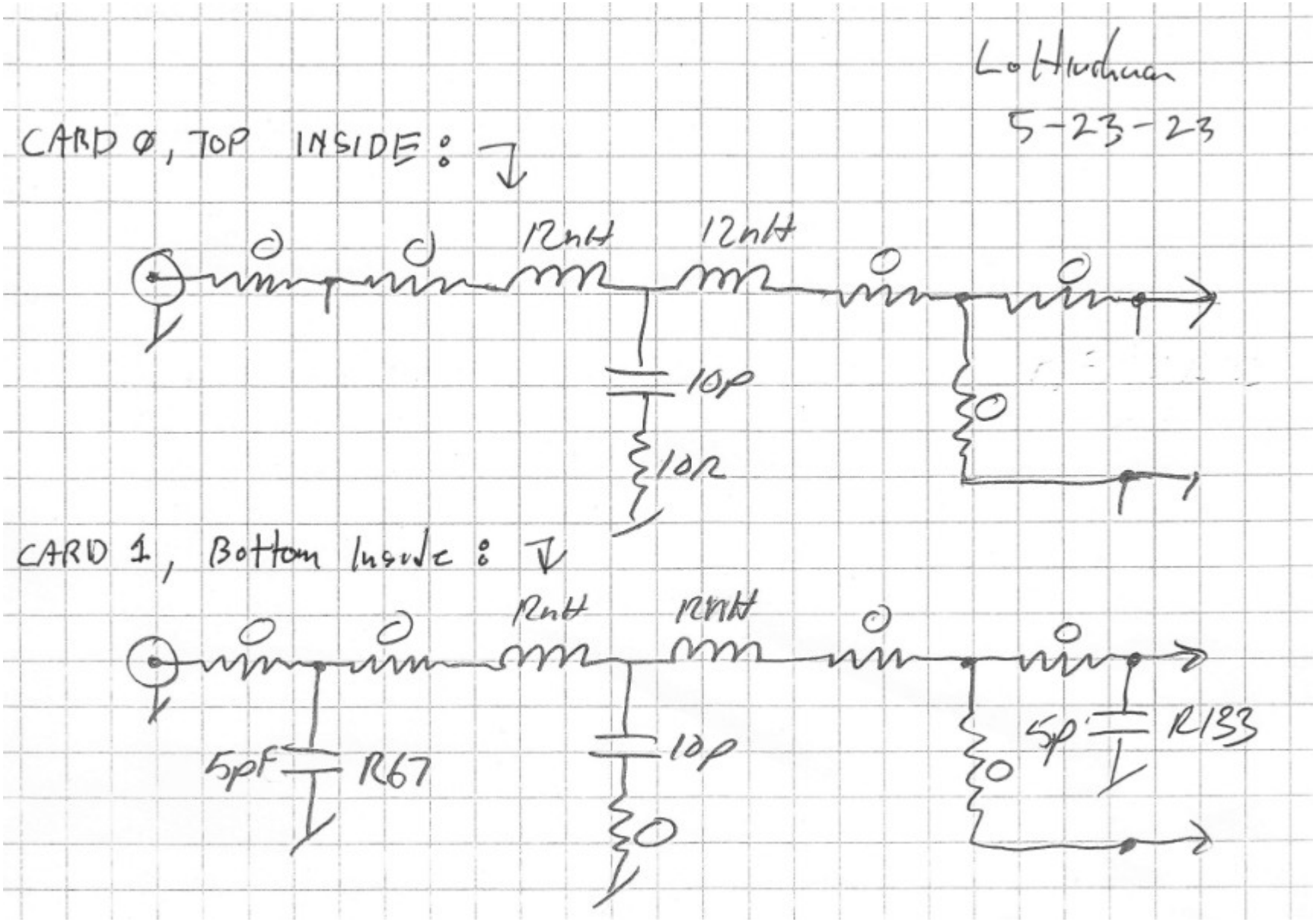
- ✗ 0 ohm resistor with old inductor is not a good option

6/20:

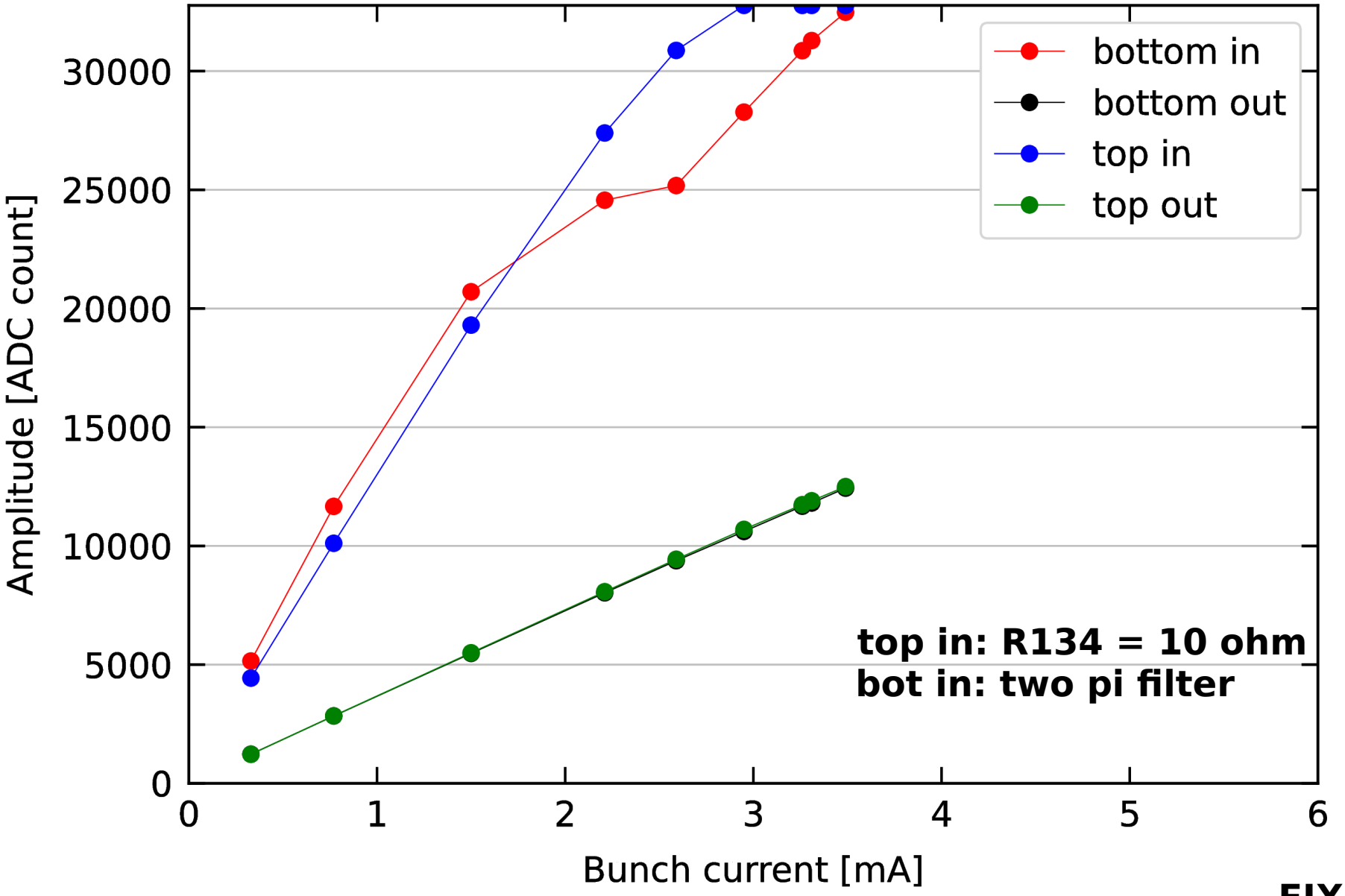
- ✗ bot in card likely still with “two pi” filter mod and R134 10 ohm
- ✗ 0 ohm slightly more linear than 33 ohm with new inductor):
  - ➢ two different cards compared → is difference meaningful?
- ✗ Shottky diode very linear but huge gain loss
- ✗ RMS noise still large for Shottky diode card with amplifier removed

Additional materials

From 5/23


L. Hudson
5-23-23
CARD Ø, TOP INSIDE:
12nH
12nH
10p
10Ω
CARD 1, Bottom Inside:
5pF
R67
10p
5p
R133

12W (ctactf133), peak-aligned at each current step – Tuesday **5/23**



FIXED GAIN