

1. In normal configuration electric field 413V/cm has been applied, so FiMCP was elevated to -3996V (on voltage monitor of PS). BiMCP and DLD were at -3800V. With preamps on, one can see on scope (50Ω input) occasional negative and positive pulses of about 30 mV in amplitude and about 80 ns wide.

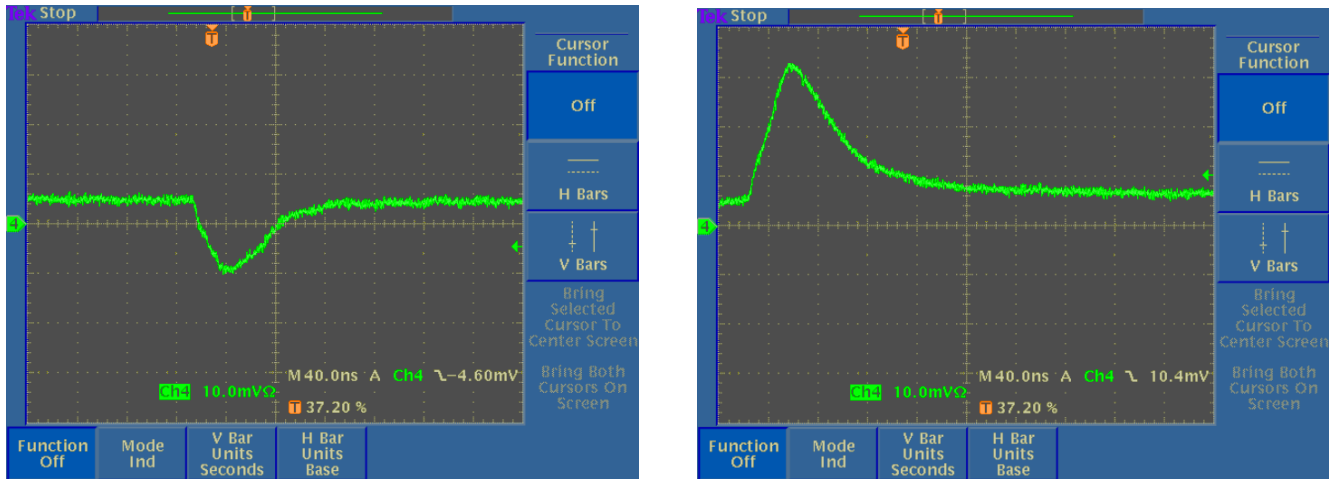


Fig. 1

2. In the same configuration with FiMCP at -4000V, BiMCP at -1300V and DLD at -1200V figure shows typical pulse from alphas. There is a ringing with period about 130 ns for about 2μs. Fine structure of the pulse (order of 20 mV) in the very beginning shows dumped ringing with half period about 20 ns and still visible oscillation with period of 130 ns.

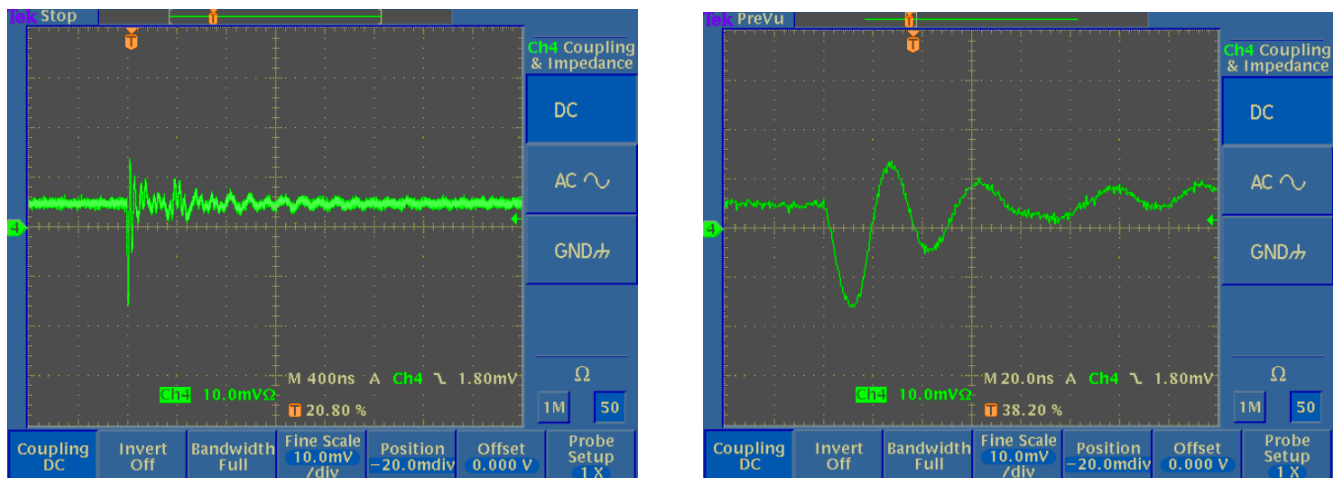


Fig. 2

3. Direct connection of the output in preamp box to scope through 4 ns cable did not change what was described in previous paragraph, except much higher amplitude (more than 100 mV).

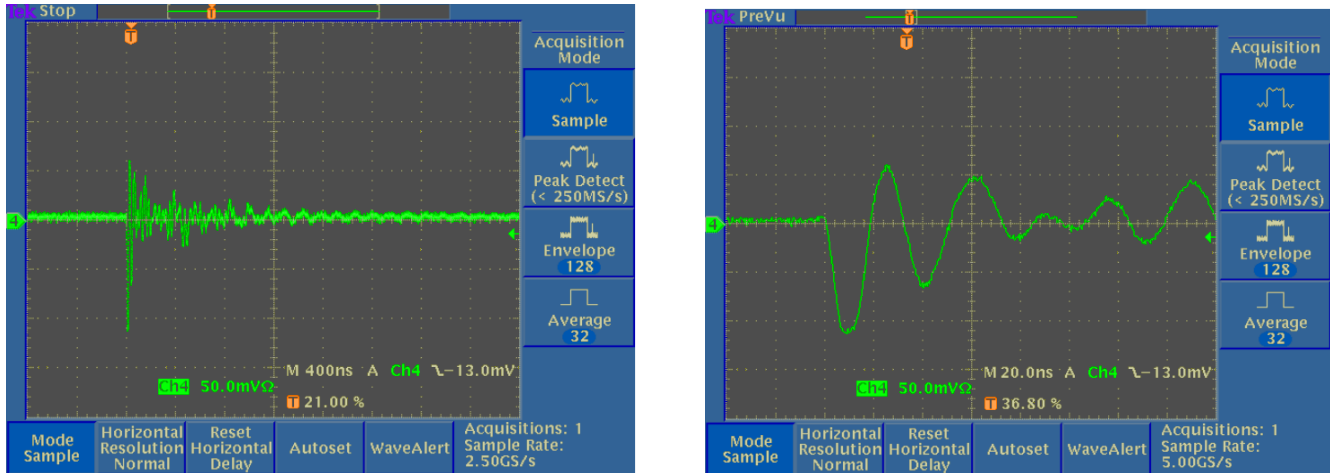


Fig. 3

4. An attempt to ground BiMCP and DLD to get rid a shunt resistor of BiMCP PS. Working voltage potential for FiMCP in this case will be 2700V (field 278 V/cm). In this case we will be able get rid HV cables of BiMCP and test their influence. HV connections to FiMCP will stay the same but they should not affect because high gain (more than 1000) of BiMCP.

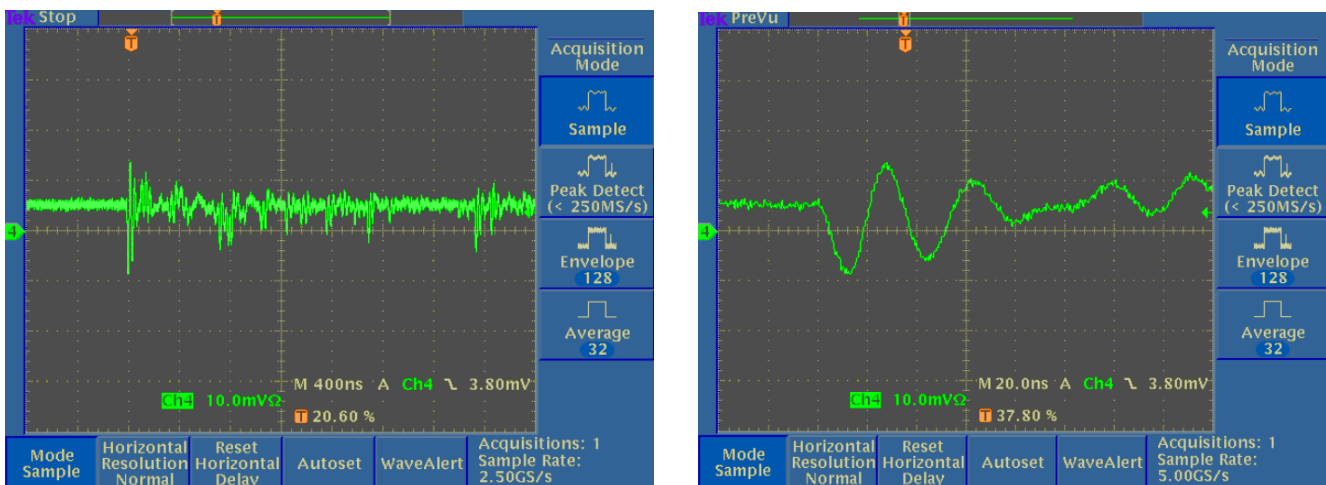


Fig. 4

5. Replacing standard BiMCP signal connection to 4 ns cable. Result is identical to that of paragraph 3.

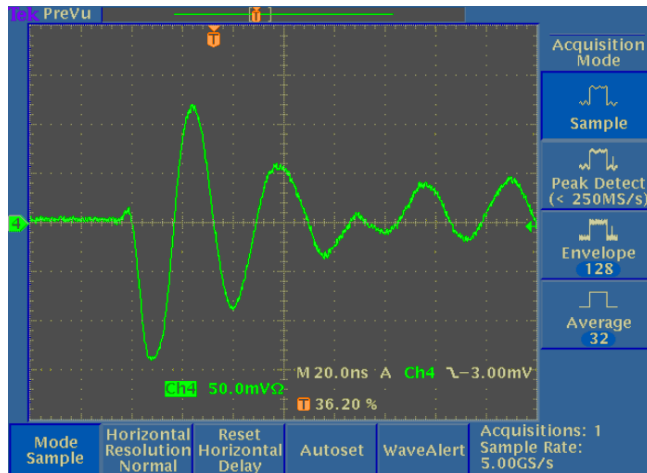


Fig. 5

6. Preamps are OFF. BiMCP pulses from α -source through 4 ns cable. As there is no inverting preamp, pulses are positive. Ringing still presents but much smaller - dumping factor is higher.

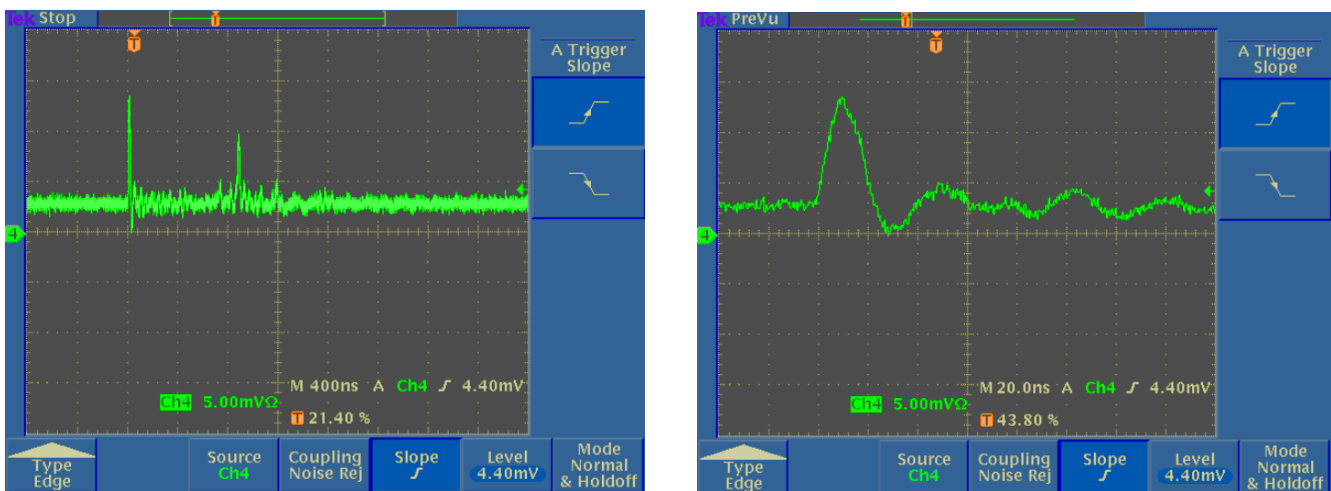
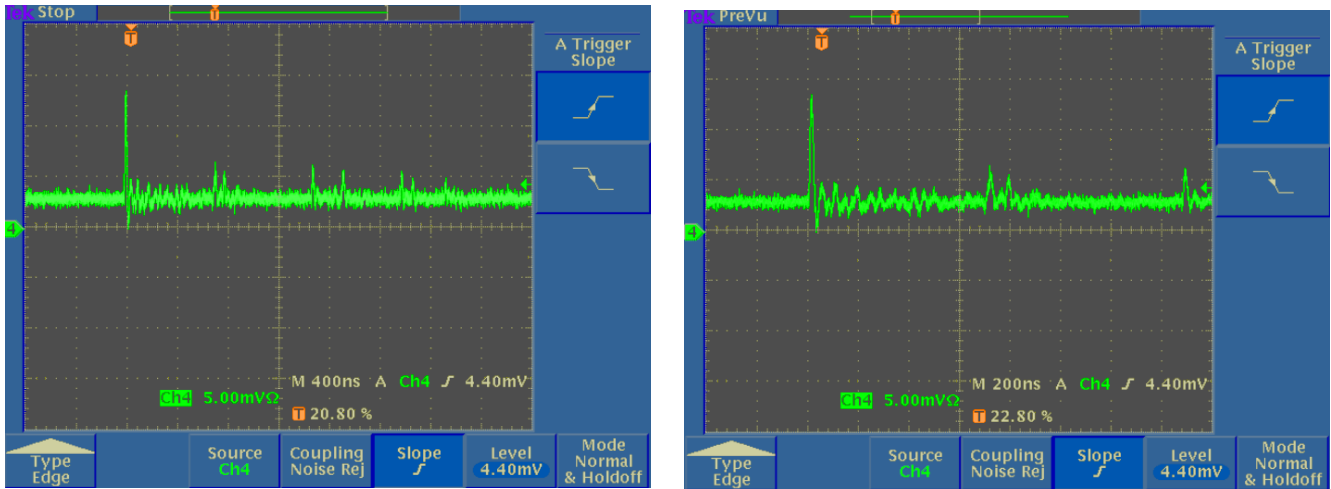


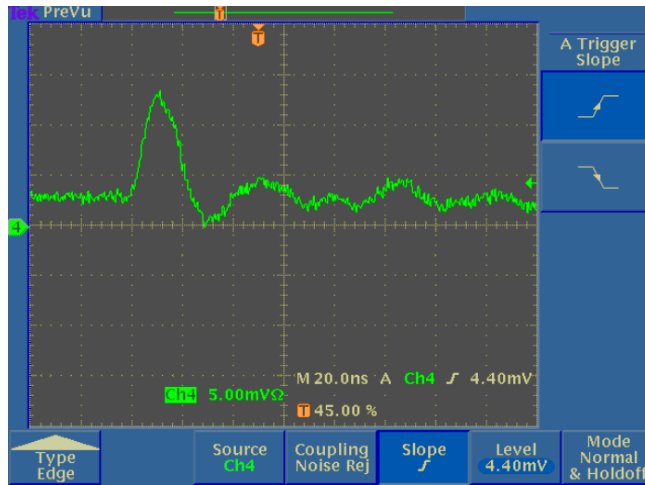
Fig. 6

7. Just in case, use as twice as short cable to FiMCP. The result is similar to that in paragraph 6.



a

b



c

Fig. 7

Some conclusions:

1. The nature of long pulses (Fig. 1) is unclear. One has to check for their presence with HV OFF.
2. Preamp for iMCP together with circuit is somewhat defective. In active state it increases ringing of the pulse, making multiple triggering (comparison Figs. 2-5 and Figs. 6-7). This has to be corrected by electronic group.
3. There are some reflections at about 700 ns (see Fig. 7b). If this is cable, then length of the cable should be about $700\text{ns} \times 30\text{cm/ns} \times 0.8/2 = 84\text{m}$?????

Additional tests to understand the nature of pulses on Fig.1.
No alpha source. IMCP/hoops connections are in working configuration.

Electric field of 413V/cm is applied but FiMCP, BiMCP and DLD all are at -4000V. Pulses as in Fig. 1 occur with frequency of few Hz.

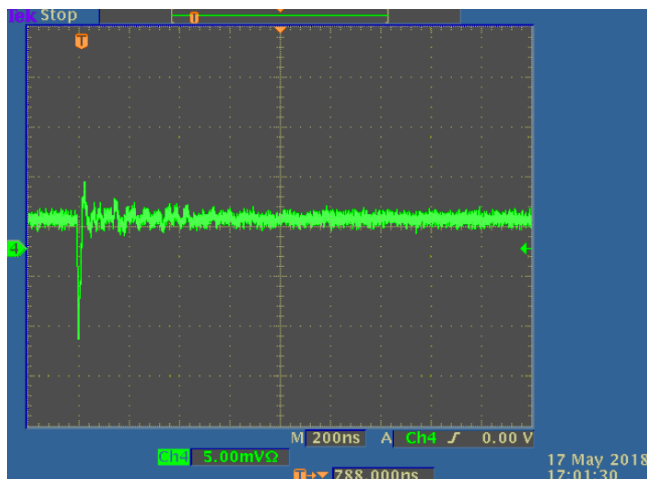
Reducing voltage on BiMCP and DLD to -3000V. Pulses still exist but occur not so frequently. At BiMCP and DLD at -2500V pulses appear less then 1 per second.

Reduction of voltage on BiMCP and DLD to -1300V (900V/plate) does not eliminate big positive pulses completely. They come in sort of groups. Negative pulses are not visible because a search for negative pulses results in detection of real signals from MCP. Tapping with hard object on lead of the box almost every time produces this weird pulse.

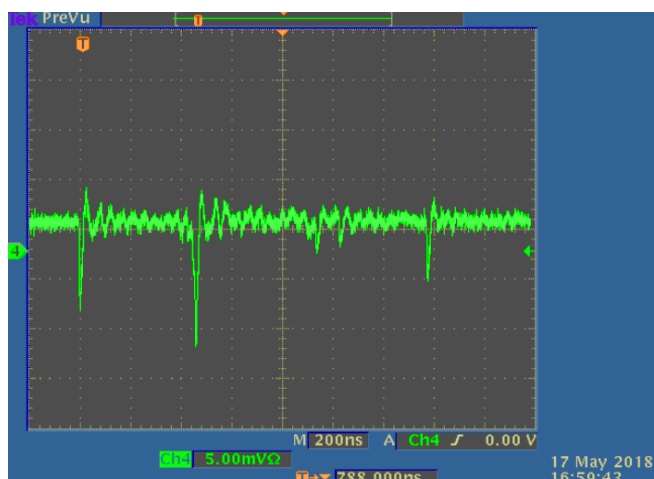
If HV PSs are turned off, even with HV cables disconnected, we still can occasionally see these pulses from preamp box.

Twisted pair cable from preamp box to iMCP connector on chamber is disconnected. BeCu connectors are shorted through 120 MΩ resistor to model iMCP. After elevating FMCP PS to -4000V and BMCP PS to -4000V or -3800V did not observe any pulses as in Fig.1. So. Source of these pulses is not in the preamps' box. It could be inside chamber when BMCP and DLD are elevated with respect to surrounding grounded elements, or, in the 12kV rated connector on the flange. Not clear yet how to find out.

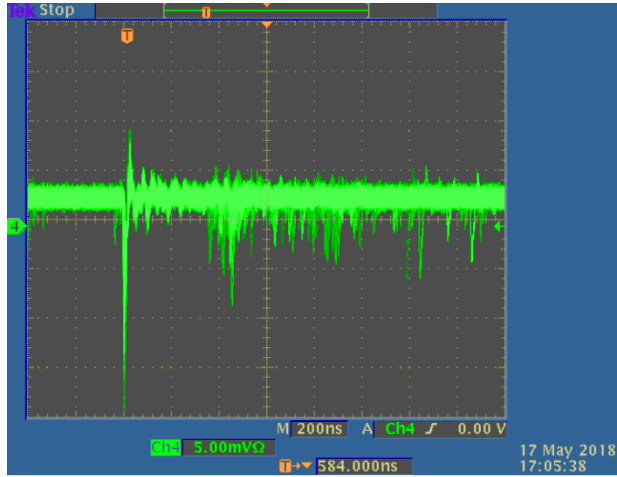
In separate tests preamps from MCP and closest DLD chip have been interchanged. The preamp from DLD is better (second pulse has smaller amplitude) but still makes ringing. Pulse shape without preamp (power OFF) is better. Pulses are negative because inverter is inserted. One can see some reflections around in 500ns but not every time.



Single trigger. No reflections.



Single trigger. Reflections are present.



Free run. Reflections.