

# new delay configuration

last modified 2017-01-03

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This is a proposal for a new delay configuration on the fs table.

Priors & assumptions:

- for self-heterodyned experiments, best to keep delay of probe constant (to avoid changes in coupling into the detection optics)
- $z_c$  for fs OPAs is around 25 feet

I propose that the ideal delay configuration would place the long-travel stage on the pump beamline for all experiments. Currently, the long-travel stage is on OPA1. In this configuration we are asked to either change the role of OPAs (pump with OPA1) or scan the probe delay. I'd like to keep the role of the OPAs consistent to make comparison between TREE and self-heterodyned experiments easier.

Since we currently have at-most three beams impingement upon the sample, our three delays *over-constrain* the delay space. Indeed, d2 and d0 both modify the same logical delay ( $\tau_{21}$ ). **I propose that we switch the locations of the stages.**

Figure 1 diagrams the current delay configuration.

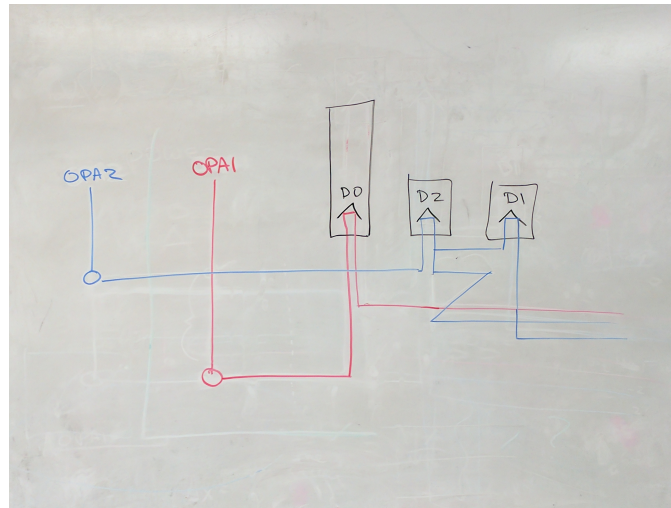


Figure 1: current

Note that, because d0 is now controlling our *pump* line, we want the majority of our dynamic range to be towards *shorter* path lengths. This means that zero delay will place d0 in the 'far' configuration, somewhat annoyingly. d2 will also be 'far', but it can be brought a couple inches closer by adjusting the OPA2 beamline one inch inward and OPA1 one inch outward.

Figure 2 diagrams the proposed delay configuration.

This change will add about 10 inches to our path length. This change will be inconsequential for our focusing setup.

This change will make it less convenient to do multi-pass experiments in the long travel stage, but multi-pass is still possible.

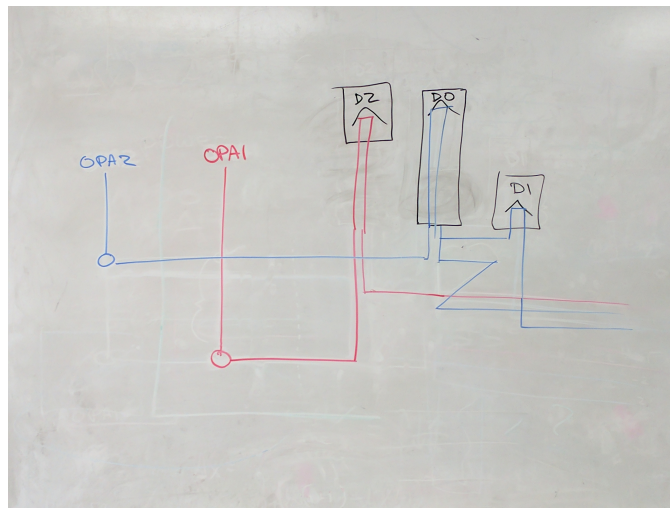


Figure 2: new

In pump-probe geometry, the transmitted split-pump will be blocked (or the beam splitter will be replaced by a mirror).

There should be no need to introduce/remove the OPA2 dogleg in this configuration.

It will remain possible to introduce leakage (800 nm) light into any of the three delay lines.

I think that I can implement this change and re-find zero delay in about one day. We should make this change before carefully re-defining the mask.