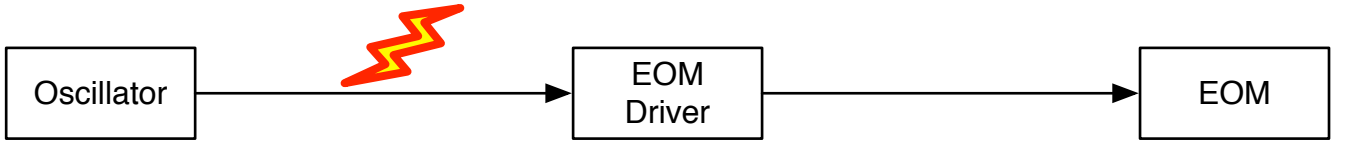
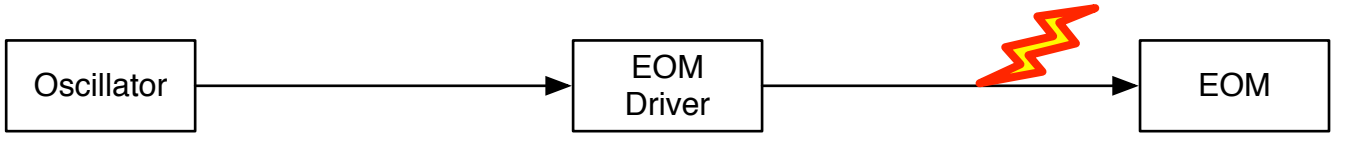
RF45 glitch: Where does the source of the issue exist?

KA 11/11/2015, based on a conversation with Keita and Daniel G1501380

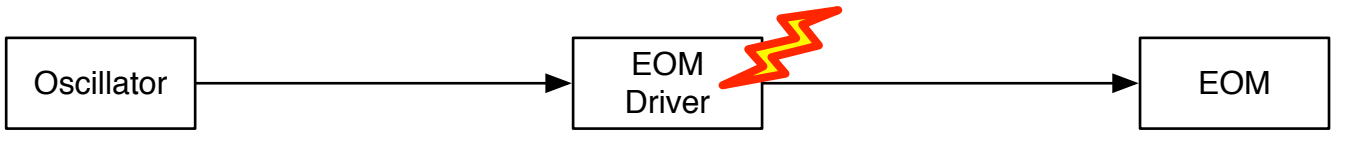
A) Between the RF source and the EOM driver?



B) Between the driver and the EOM?



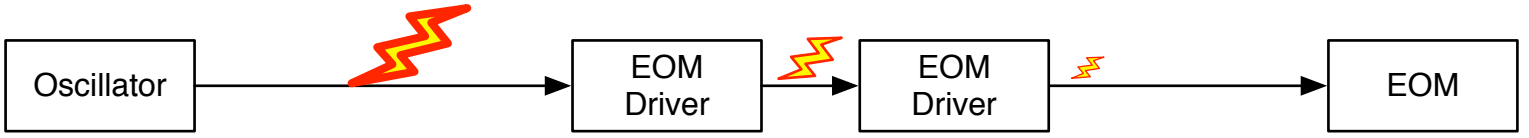
C) Or the EOM driver itself?



D) Or... could be much more complicated.

A) Between the RF source and the EOM driver

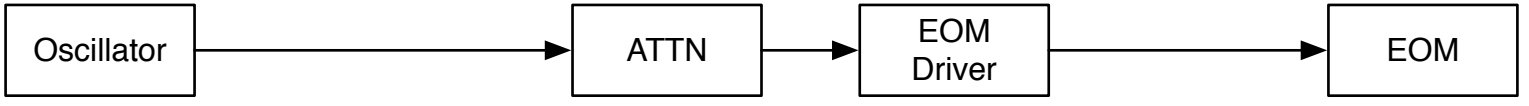
Cascading the EOM drivers might help to mitigate or identify the problem.



This does not help phase fluctuation associated with the glitch.
Or even the amplitude stabilization may cause additional phase fluctuation due to the feedback. (Does it cause a big problem? Possible.)

Q. How much do we know if this DARM glitch is caused by the oscillator amplitude?

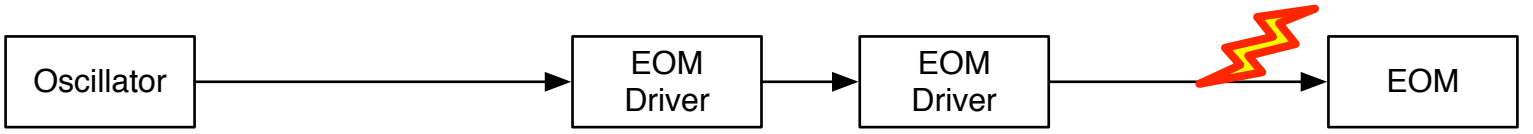
Does the attenuator before the driver unit help to reduce the impedance mismatch due to shaking of the cable, or something else?



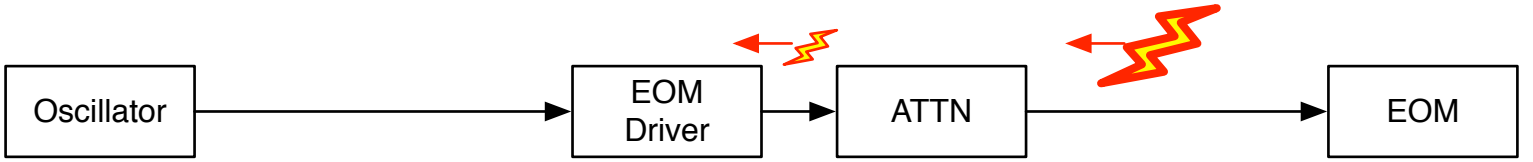
I doubt it, because the first module inside the EOM driver unit is the variable attenuator which has the nominal attenuation of ~10dB. (cf The EOM driver structure)

B) Between the driver and the EOM?

Cascading the EOM drivers won't help to change the situation.



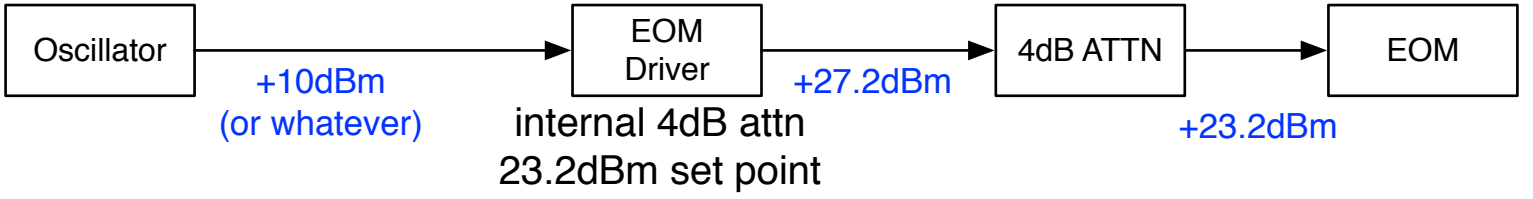
If the problem is caused by spurious coupling / reflection from the EOM side towards the EOM driver, the effect might be improved by placing the attenuator at the output of the EOM driver. (Again, this does nothing good for the oscillator phase noise.)



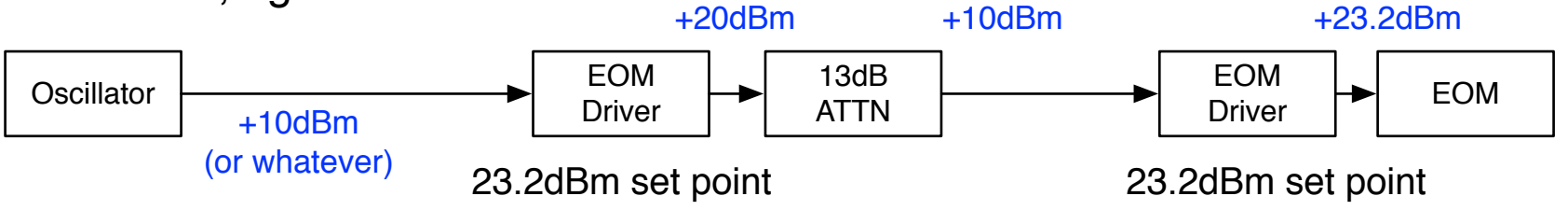
B) Between the driver and the EOM? (cont'd)

However, the present output level of the EOM driver is 23.2dBm
It is close to the maximum of the driver capability.

This problem can be by passed by introducing an additional attenuator inside the EOM driver unit between two power splitters. Daniel once did it during the noise test.
(Currently, the output power is limited by the range of the amplitude detector, not by that of the var. attn.)



Or, place another EOM driver in the PSL enclosure. This stabilizes something bad between the first EOM driver and the PSL enclosure. We might not be able to control the second one from remote, I guess?



C) The EOM driver itself?

If one of the driver is bad, we should be able to solve the issue by exchanging the units.
=> It was already tried.

If both the drivers are bad, why don't we see the issue at CER?

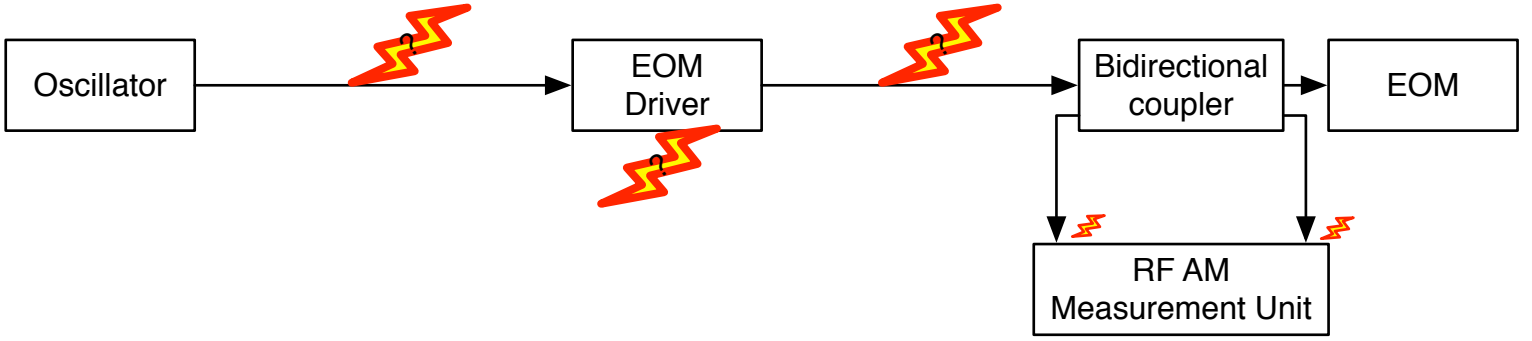
Does the cascading of the units tell us something if we can monitor those two simultaneously?

In any case, I have two functional modules (although the tuning frequency is 9MHz)

C1) Is there any test I can do at Caltech?
C2) If they need to be immediately shipped to LHO, let me know.

D) Or... could be much more complicated.

Then, we should know more about the problem. One idea, by Daniel, is to insert a directional coupler inline and use the AM measurement unit(s) to monitor the AM level.



It is better to place the coupler close to the EOM (i.e. in the PSL enclosure).

One RF AM Measurement Unit can handle two RF inputs. One has fixed input level and the other has auto-bias. Therefore, the former channel should be used for the forward wave port, and the latter should be used for the reverse wave port.

It'd be better to have the DAQ connectivity for the RF AM Measurement unit so that it can be monitored continuously.

Structure of the EOM driver