Coherence lenght tests on HLS II laser

After the delivery of the new HLS II system during spring -86 it turned out that the C.L. still was not satisfactory,and that the results were not as good as they were with the same laser when it was tested in Rugby. During discussions between LHAB and JK the idea has been brought forward that this could be due to slight differences in set up and illumination, and different photo materials and developing processes.This seemed very unlikely to us,but still it was a fact that something must be different in the conditions as the results had changed.That the explanation should lie in differences in alignment of the laser,we also found quite unlikely,as it had been very properly adjusted and aligned here in Stockholm by Tim Lang.

It was after theese considerations that we suddenly got aware that there in fact was a principal difference between how we make the holograms at LHAB and how they are made at JK.At LHAB we make the holograms on glass plates,wich are exposed and processed one by one,or maybe a few at the same time.This means that the laser is fired with quite a long time period between each exposure.At JK on the other hand the holograms are made on roll film,in a camera,and therefor 20 - 35 exposures are made one after the other, fairly quickly.Another thing is that when the laser is initialy tuned at JK,it is also fired with a large number of shots after each other(this for instance the case when the etalons are adjusted).

So our idea was that theese differences in driving conditions might influence the performance of the laser.

-I.The first test we made,was to see how the cooling system could cope with a quick series of shots.

It turned out that already after 15 shots the temperature (in the cooling tank) had rised 1^{o}C and that it took about 7 minutes until the thermometer in the tank was back to the start temperature!

This indicated that the variations in results between LHAB and JK could be caused by termal influence.

-II.The second test we made,was to make a number of holograms at different cooling water temperatures.The exposures were made with minimum 3 minutes between the shots,to get a even cooling water temperature,that was not influenced by the fireing of the laser.

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Results:

Temp.	No fri.	weak f.	strong	No. holo Σ	Comments
20,5	1	4	5	10	
21,0	7	3	1	11	
21,5	1	7	2	10	
22,0	7	1	2	10	
23,0	9	0	1	10	
23,0	8	1	1	10	One day later
23,5	7	3	0	10	One day later
23,0	8	0	1	9	Approx. 30 days later

The laser settings were:Delay1:125,Delay2:999,Bias:3kV
Osc.Cap:168,Delay:250,Amp.Cap:200

This gave an output of approximatly 200 mJ

The holograms were made on 8E75 HD sheet film,dev. in Neofin Blue