



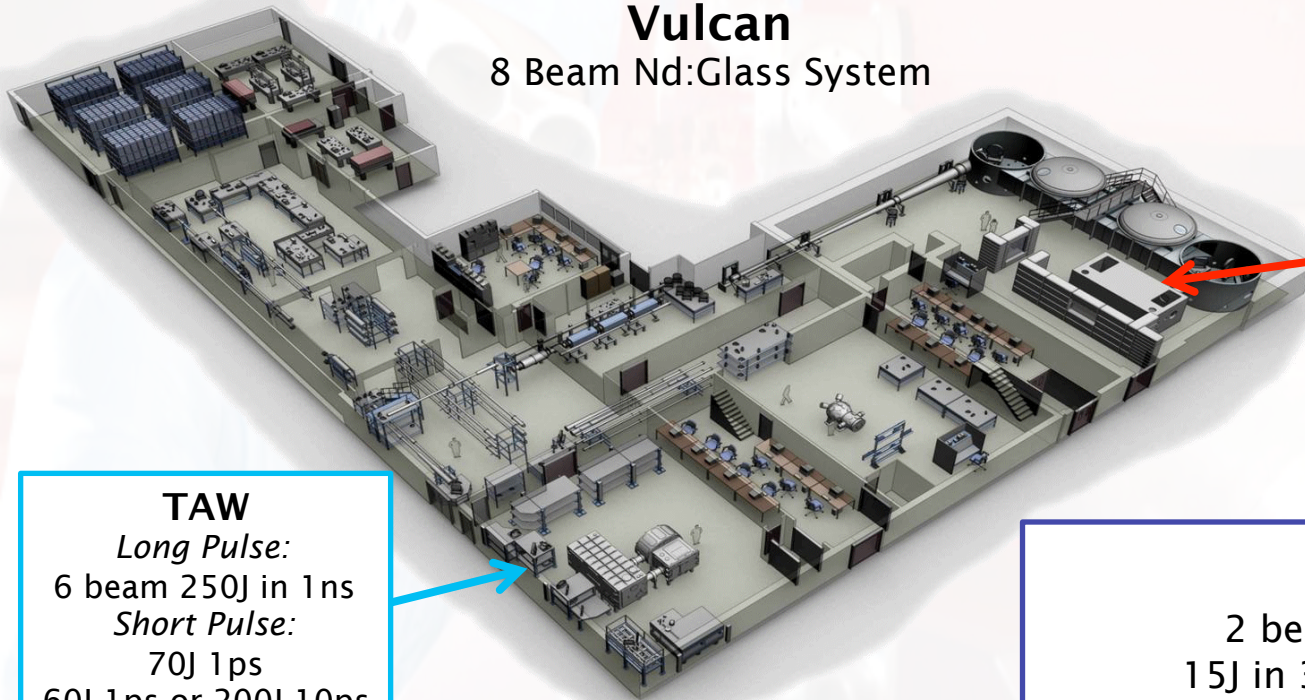
Short pulse diagnostics improvements in the Vulcan laser system

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Vulcan
8 Beam Nd:Glass System



TAP
Long Pulse:
250J in 1ns
Short Pulse:
500J 500fs

TAW
Long Pulse:
6 beam 250J in 1ns
Short Pulse:
70J 1ps
60J 1ps or 200J 10ps

Gemini
2 beams TiSa System
15J in 30fs, 20s Rep. Rate



Summary

Vulcan Laser Diagnostics & Automatic Alignment

Target Area Petawatt Contrast Characterisation

Short Pulse Diagnostics

Conclusion

Software & Automatic Alignment

Diagnostic Server - Vulcan

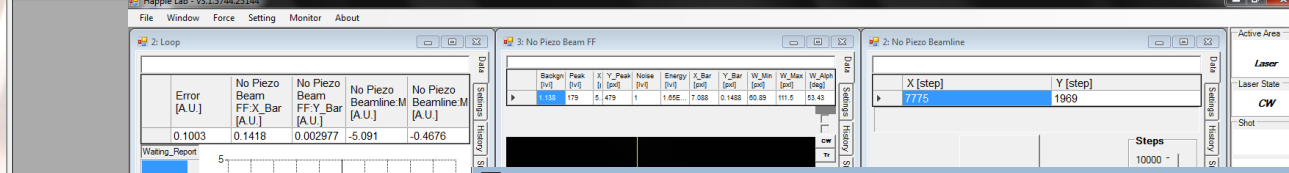
File Force Setting About

Report FC List Static Tree

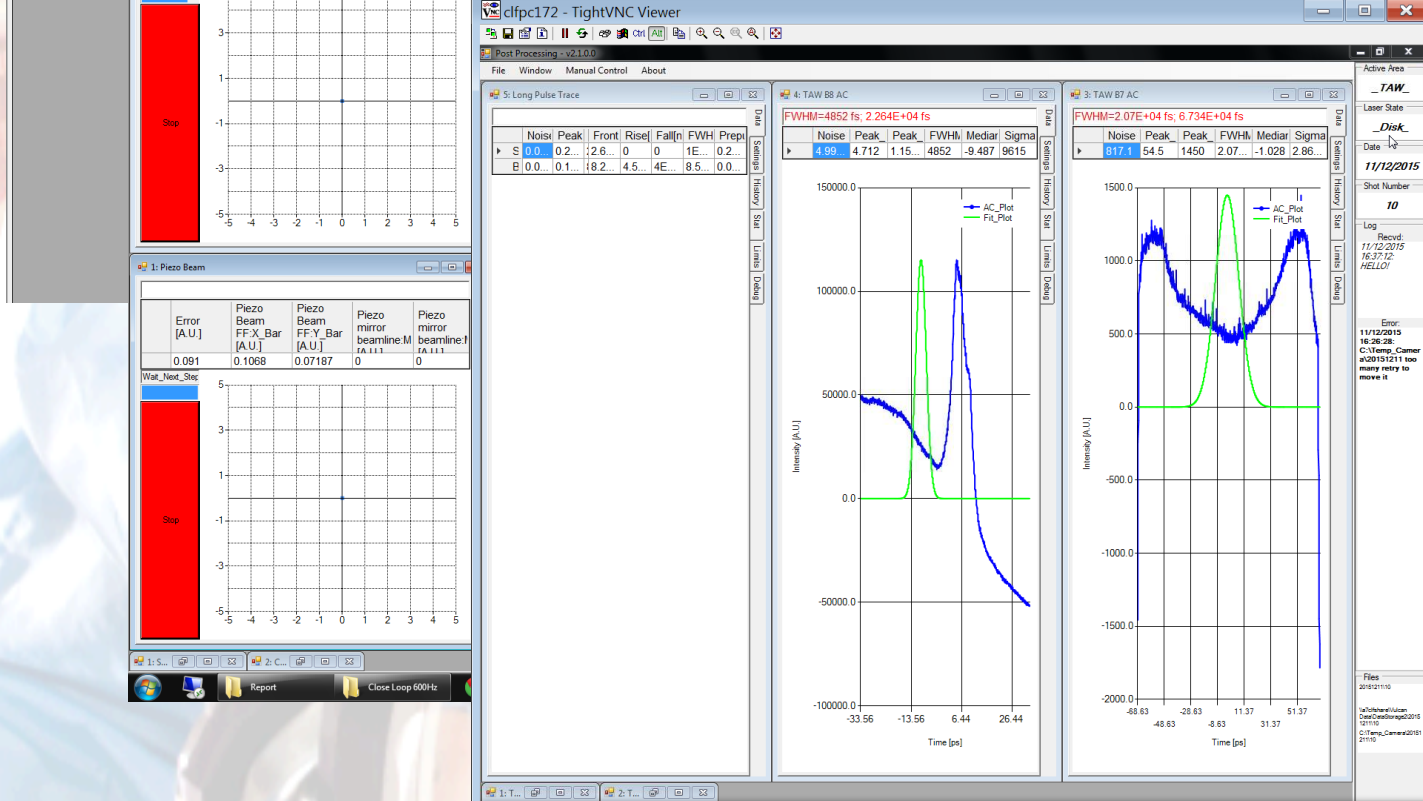
Time	Name	Sender	Message
05/10/2015 19:57	LA3 Picomotor Control	LA4 LP CW	
05/10/2015 19:57	LA3 Picomotor Control	LA3 Tower	
05/10/2015 19:57	LA3 Picomotor Control	LA3 LP	
05/10/2015 19:57	LA3 Picomotor Control	LA3 B7 TAW	
05/10/2015 19:57	LA3 Picomotor Control	Dummy	
05/10/2015 19:58	LA3 Picomotor Control	LA4	

Active Area: Laser, Rod Chain, Disk Shot, Shot: 7

Diagnostic Server

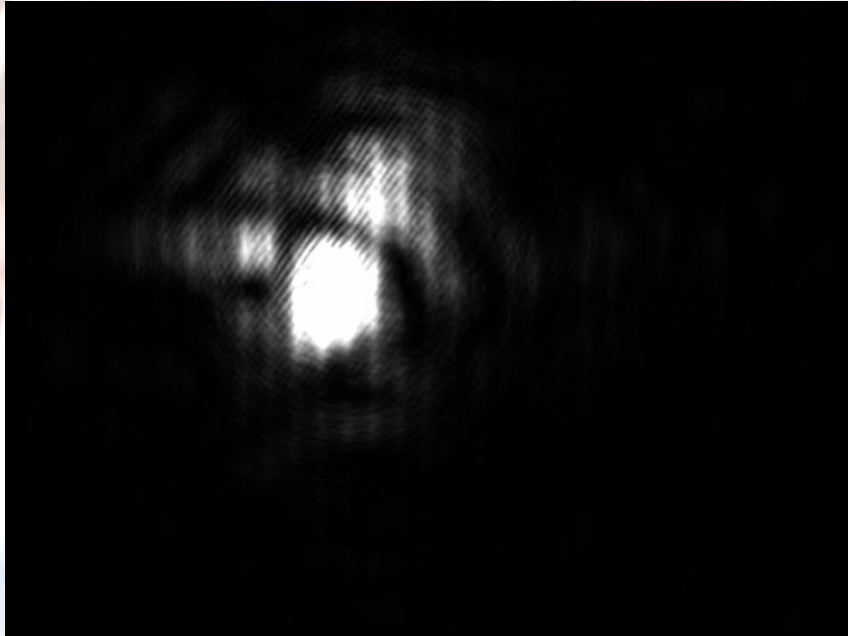


Camera Software & Automatic Alignment

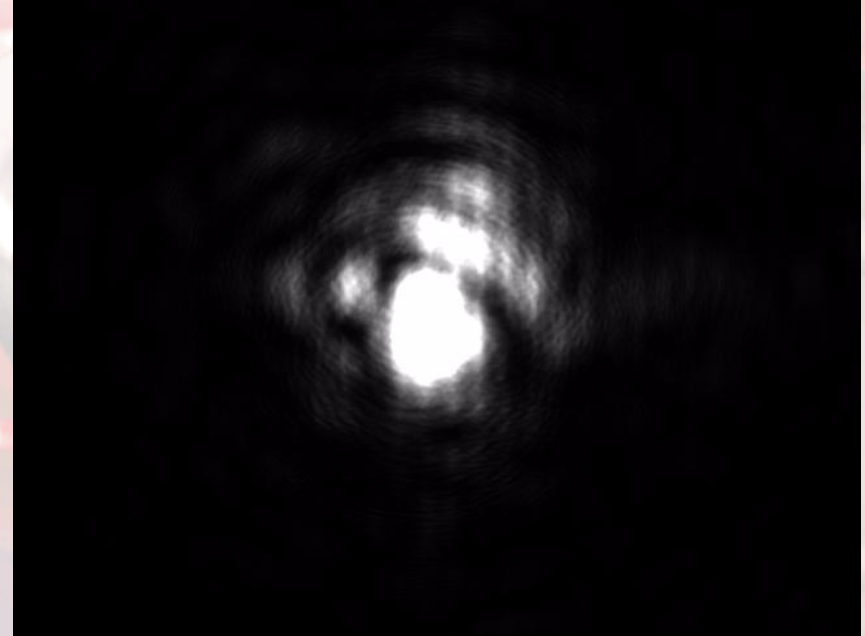


Post Processing

Fast Beam Pointing Stabilization



PID off



PID on

PS3-21 M. Galimberti, D. Shepherd, B. Parry, C. Hernandez-Gomez
Fast beam pointing stabilization for high power laser system

Data Database: Icat & eCat2

[Load](#) [Save](#) [Save As](#) [Delete](#) [Filters](#) [Functions](#) [Summary](#) [Plots](#) [Export](#) [Rename](#) [Help](#)
Logged in as: xny61687 [Logout](#)

eCat2
 Version: 2.0.1-SNAPSHOT
 Built: 2015/11/20 14:05:49

Select by time | Select by expt | Select by id | Select continuous

Last 24 hours | Last 7 days | Last 28 days | 2016-04-08 16:27 to 2016-05-06 16:27 | Get data

Data types
 VD
 VR
 VF
 VE

Max. shots
 50
 1000
 Unlimited

Visible Shots
 10
 20
 50

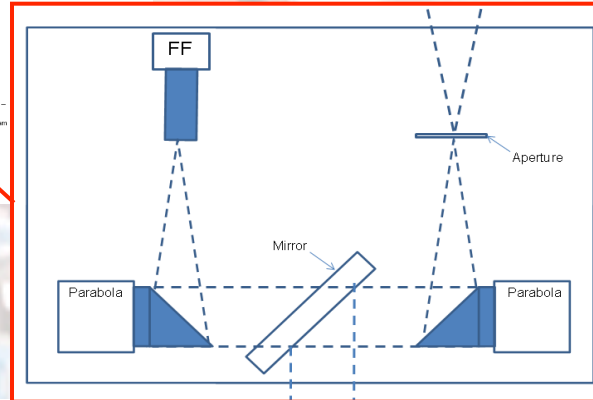
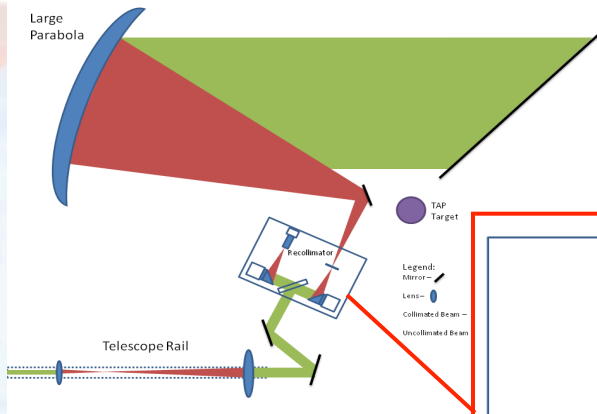
Data Channels
 Dataset
 Laser area 3
 Control room
Laser area 4
 Tap m2 diagnostics
 6mm aperture
 Tap full size
 Corner
 Input Ia1
 Rod chain
 2hz opcpa
 Taw stretcher
 Taw full size

Id	Time	Shot number	Fired energies la4 beam 7	Tap b07 nf1 image	Tap b07 ac1 image	H2m b07 ac1 ac ac [a.u.]	H2m b07 ac1 image	H2m b07 ac1 ac rep fwhm	La4 b07 ff1 image
20160506161006VD	2016-05-06 16:10:06	1	614.5					1389.518	
20160505165429VD	2016-05-05 16:54:29	3	617.7					3826.21	
20160505161142VD	2016-05-05 16:11:42	2	550.1					1147.863	
20160505110644VD	2016-05-05 11:06:44	1	614.5					1006.897	
20160504201231VD	2016-05-04 20:12:31	3	563.1					976.69	
20160504174410VD	2016-05-04 17:44:10	2	630.6					1600.967	
20160504161544VD	2016-05-04 16:15:44	1	0					0	
20160503203404VD	2016-05-03 20:34:04	3	620.9					0	
20160503194224VD	2016-05-03 19:42:24	2	598.5					1691.587	

1-22 of 22

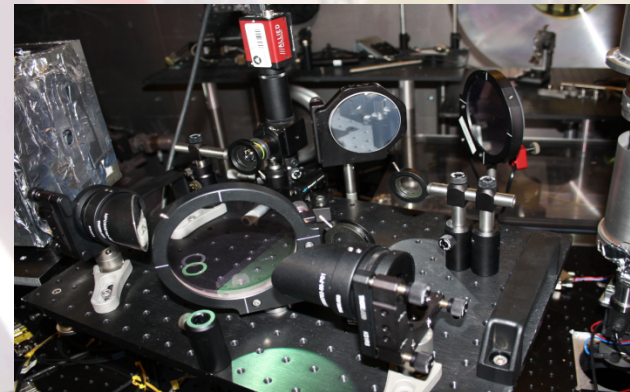
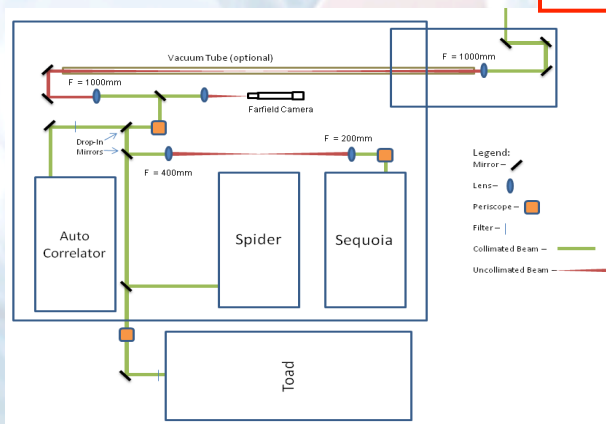
TAP Contrast Measurement: Layout

Full Beam (dia 60cm) recollimated using small OAP inside target chamber

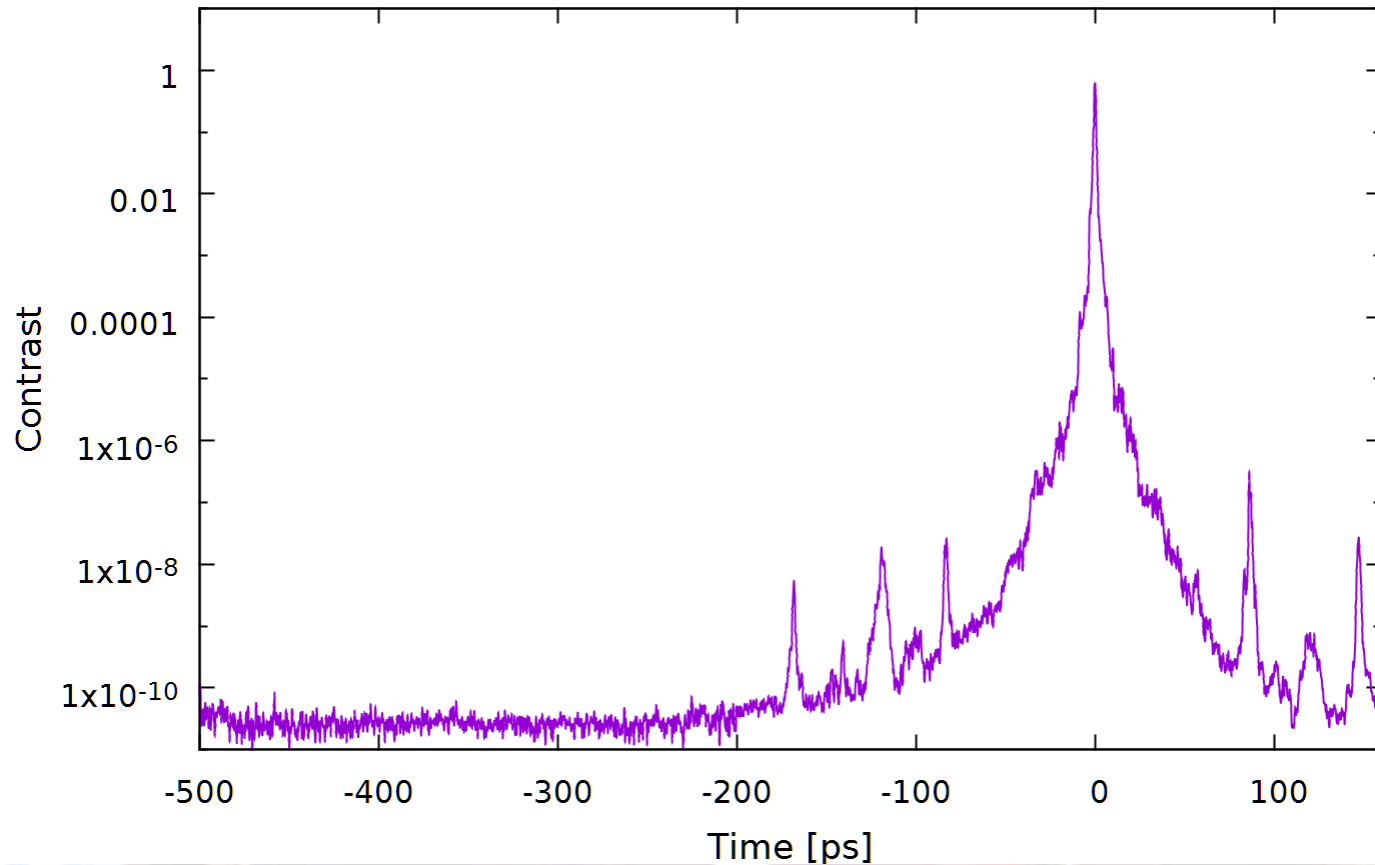


Improved relay imaging

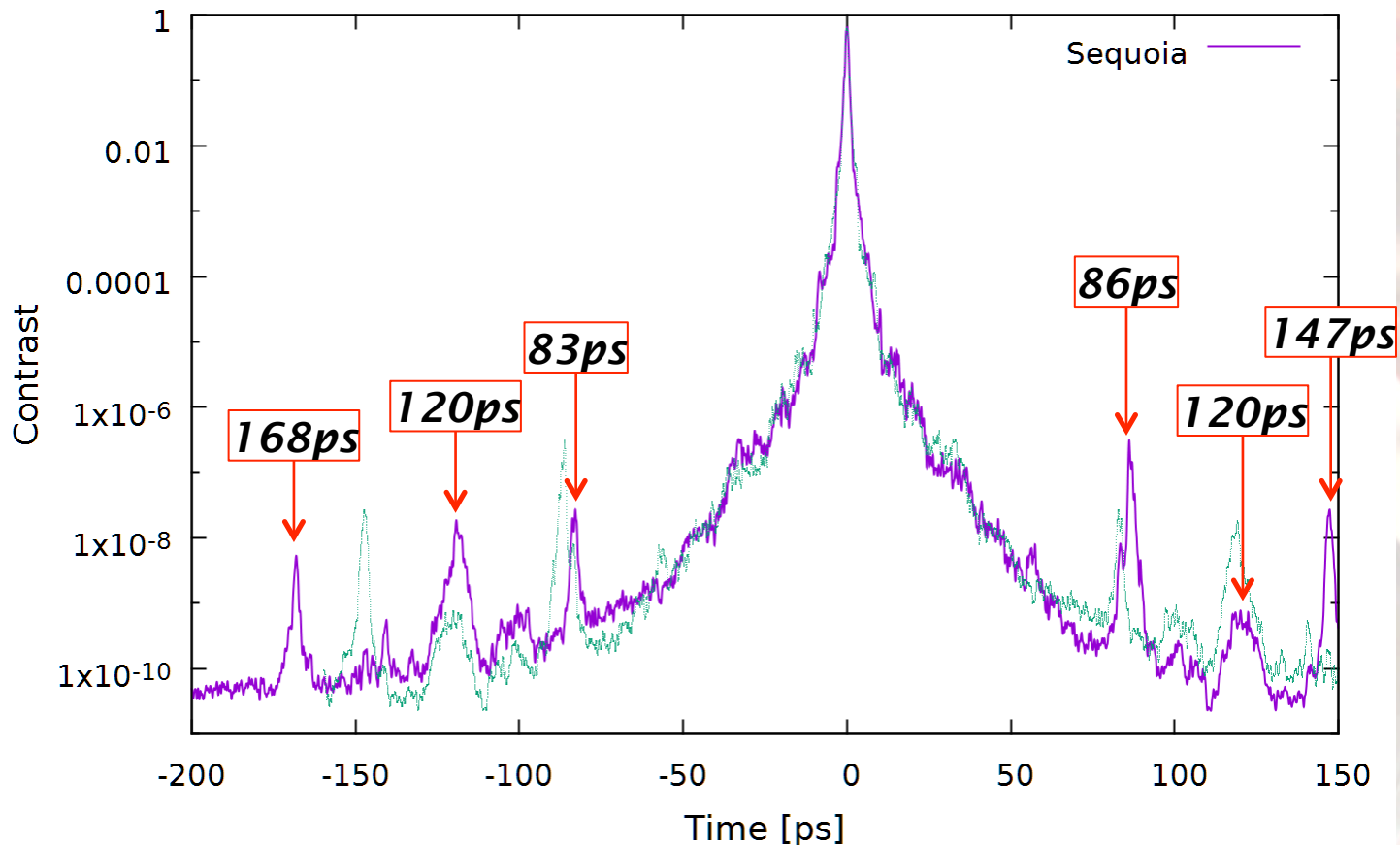
Scan performed with only the Front-End bypassing the amplifiers



Long Scan



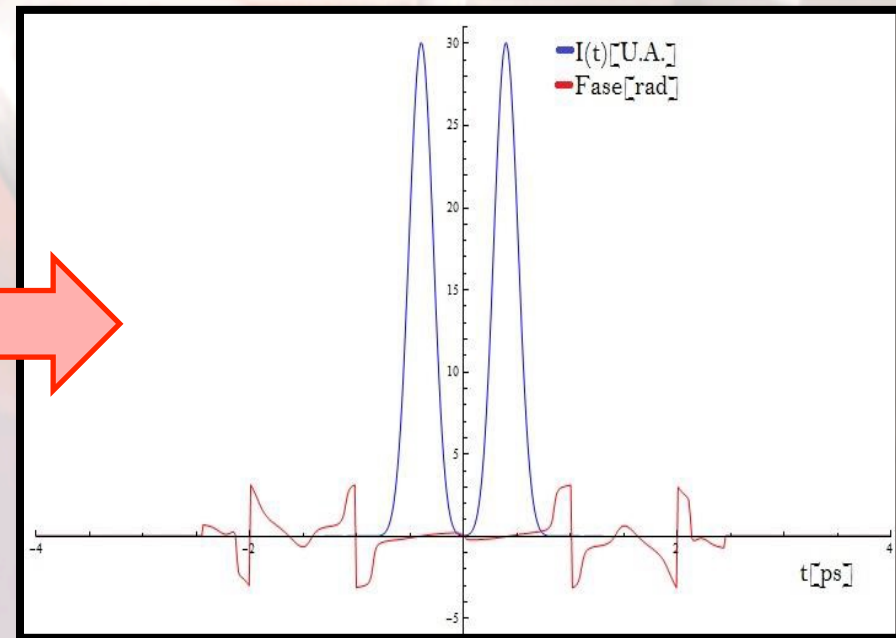
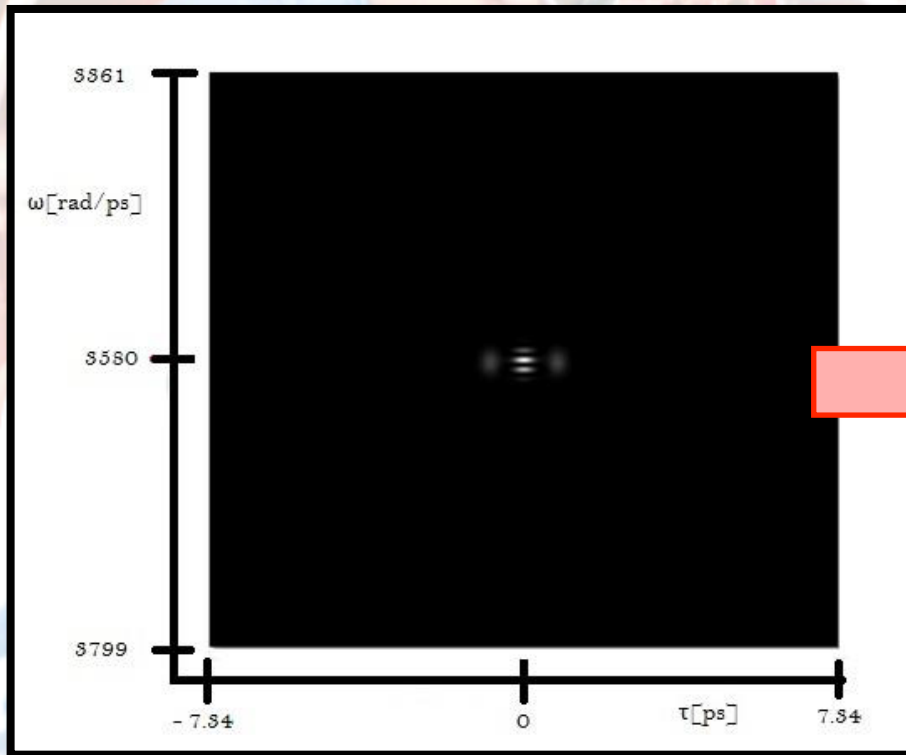
Pre-post pulse



New post-to-pre pulse mechanism identified

FROG/GRENOUILLE Analysis

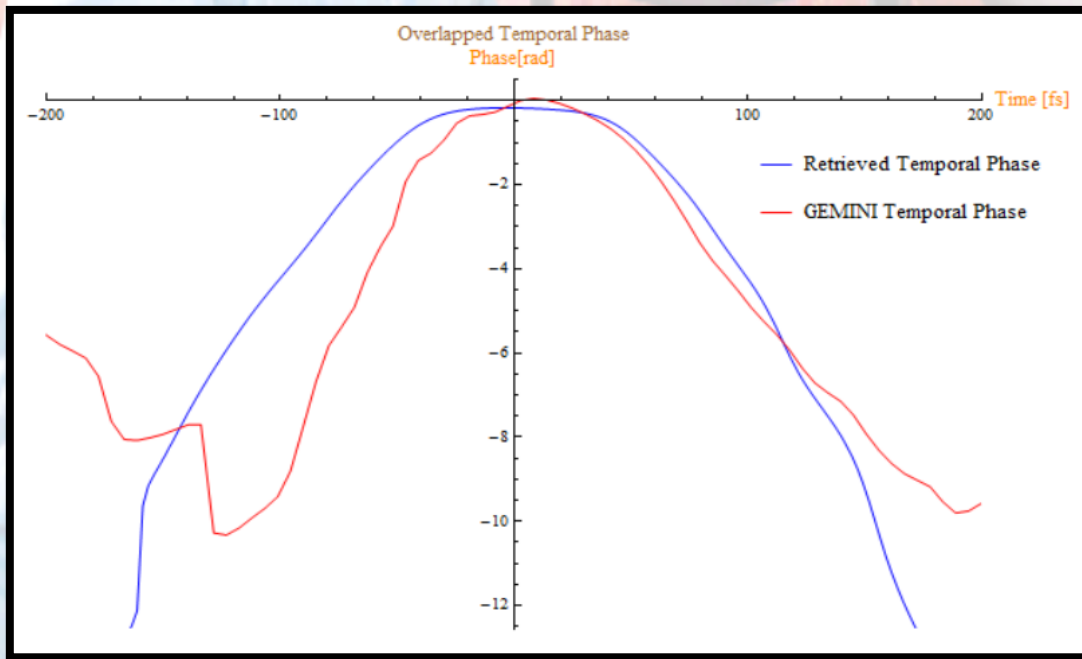
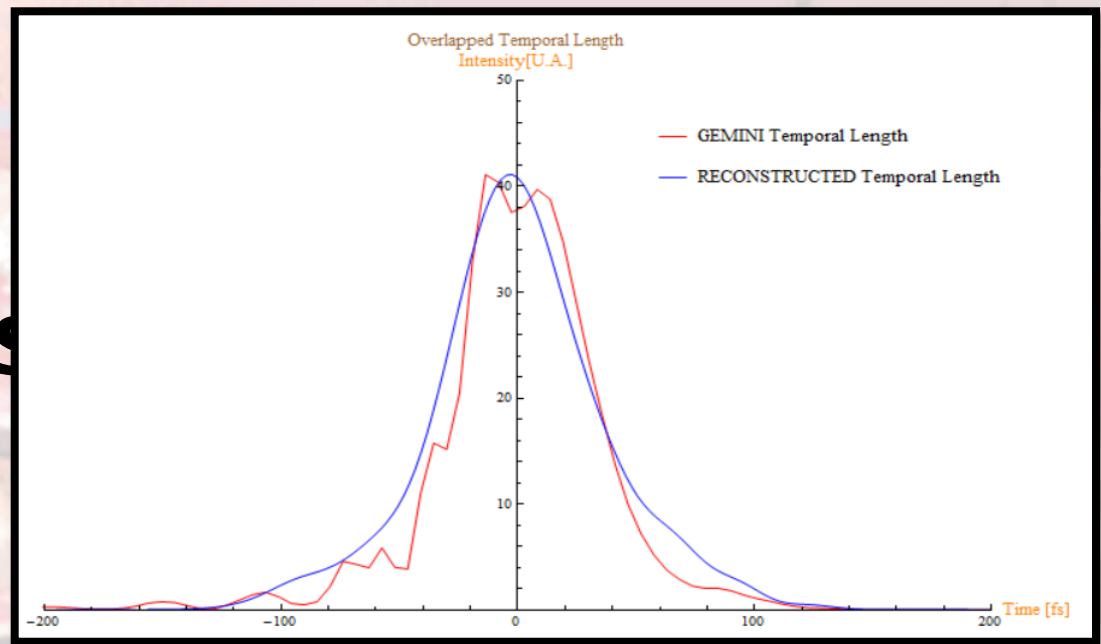
Reconstruction Software developed by Mario Galletti in collaboration with prof. Danilo Giulietti at University of Pisa



M.Galletti, Sviluppo di un software di ricostruzione e caratterizzazione di impulsi laser ultracorti di alta potenza, Master Thesis, 15 Dec. 2014, Pisa



Gemini Full Power Measurements



The GEMINI temporal length is 61 fs while the *reconstructed temporal length is 64.29 fs.*



Conclusion

Improve Diagnostic Software & Add eCat viewer

Automatic Alignment is now operational

Improved Contrast Characterization in TAP

Developing new Short Pulse Diagnostics