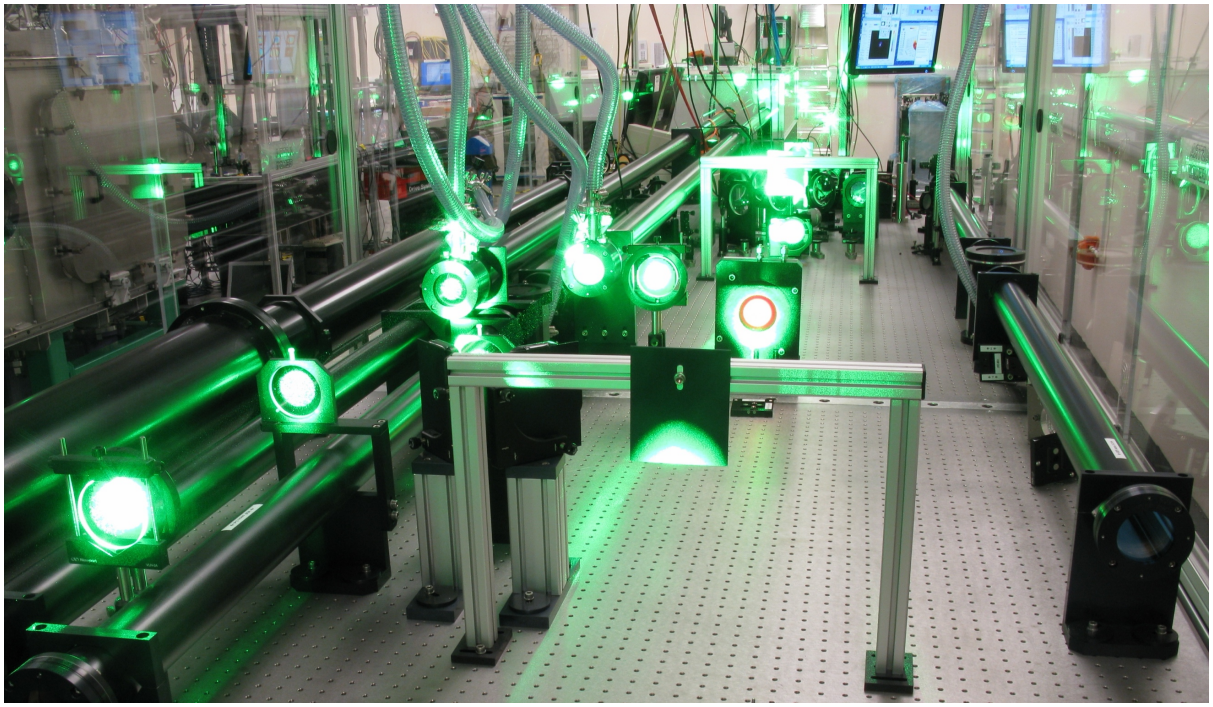

CLF Experimental Pack for Principal Investigators

Release 1.07

Updated 2nd Feb 2024

This pack is intended for Principal investigators applying for time on one of the CLF High Power Lasers. This pack includes:

Form L1. Preliminary request for laser parameters.

This form should be completed with requests for laser parameters.

Form T1. Preliminary request for Targets.

This form should be completed with requests for targets, filters, pinholes etc. Gas targets should be requested on form T1a.

Form T1a. Preliminary request for Gasses.

This form should be completed with requests for gas targets.

Form D1. Preliminary request for Diagnostics.

This form should be completed with requests for diagnostics.

These forms are intended to provide the facility staff with the technical details required to assess the implementation of the experiment if scheduled. This data will form the first stage layouts and details to expedite the experimental planning processes should your experiment be scheduled. The details here will also enable the facility staff to determine (in consultation with yourselves) the earliest facility access slot that the experiment could be scheduled, based on R&D, diagnostic availability etc.

The information you provide in these forms are for the initial assessment and early planning of the experiment. We understand that experimental requirements evolve and as such the details included here may change as the experimental planning process is underway.

Form L1. Preliminary request for laser parameters.

Full facility capabilities are distributed with the original call for proposals.

Part 1. Vulcan TAW Experiments:

Not available

Part 2. Vulcan TAP Experiments:

Not available

Part 3. Special options for Vulcan configurations: (please tick as required)

Not available

Part 4. Gemini TA3 Experiments:

4.1 Gemini Beam requirements (Please specify)

Gemini North beam	
Compressed energy	
Pulse duration (nominal 40fs)	
Final focusing optic	
Compressor Bypass	

Gemini South beam	
Compressed energy	
Pulse duration (nominal 40fs)	
Final focusing optic	
Compressor Bypass	

4.2 Other Gemini beam requirements (please tick as required)

Apodised beam	
Split beam	
Pre-pulse	

Apodised beam	
Split beam	
Pre pulse	

Part 5. Gemini TA2 Experiments: (please tick as required)

Not available

Form T1. Preliminary request for Targets.

This form should be used to detail your target requests for the campaign. Requirements have been grouped into target types, characterisation needed and also pinhole and filter requirements.

Targets have been grouped into a number of standard types, please use these descriptions wherever possible. It is expected that for most requests there will be further target details added in the 'other details' section. Mounting details should be competed so that the target can be integrated into the experimental set-up. When filling in the number of shots required, please only add the **number of shots expected**. The target fabrication group will assess the yield of targets and will make appropriate spares. Including spares in the request will delay the fabrication of other targets and will affect the experimental campaign. Over requests will result in target types being cut from other parts of the experimental list.

Specialised or non-standard target requests requiring R&D or on long lead time should have been discussed with relevant Target Fabrication staff prior to proposal submission. In addition if detailed characterisation of a target is needed (e.g. for publication) please state this. If you would like to discuss the characterisation that is available please contact a member of the target fabrication team.

Please detail all diagnostic pinhole and filter requirements. Not all pinholes or filter materials are kept in stock and unless requested they cannot be guaranteed for the experiment.

Form T1. Preliminary request for Targets.

Part 1. Experimental Targets:

Target Type 1 (please tick as required)		**Mounting**(please tick as required)		
☐ Proton Foil ☐ Simple Backlighter ☐ Foil 1-100um ☐ Thin foil 100-1000nm ☐ Ultra-thin foil <100nm ☐ Low density target ☐ Dot target ☐ Layered Target (please specify) ☐ Mass limited target ☐ Cone/Hohlraum ☐ Complex 3D (Cone/shell) ☐ Other (please specify)		☐ Single shot ☐ Part of a Cluster ☐ High-rep Rate Array ☐ Complex Array (e.g double foil) ☐ Nano-positioing wheel ☐ C-mount ☐ Tape target ☐ Other (please specify)		**Expected number of targets (shots) required** **Other details:**
Material		**Source**	☐ CLF Target Fabrication ☐ Other	
		Contact details		

Target Type 2 (please tick as required)		**Mounting**(please tick as required)		
☐ Proton Foil ☐ Simple Backlighter ☐ Foil 1-100um ☐ Thin foil 100-1000nm ☐ Ultra-thin foil <100nm ☐ Low density target ☐ Dot target ☐ Layered Target (please specify) ☐ Mass limited target ☐ Cone/Hohlraum ☐ Complex 3D (Cone/shell) ☐ Other (please specify)		☐ Single shot ☐ Part of a Cluster ☐ High-rep Rate Array ☐ Complex Array (e.g double foil) ☐ Nano-positioing wheel ☐ C-mount ☐ Tape target ☐ Other (please specify)		**Expected number of targets (shots) required** **Other details:**
Material		**Source**	☐ CLF Target Fabrication ☐ Other	
		Contact details		

Target Type 3 (please tick as required)		**Mounting**(please tick as required)		
☐ Proton Foil ☐ Simple Backlighter ☐ Foil 1-100um ☐ Thin foil 100-1000nm ☐ Ultra-thin foil <100nm ☐ Low density target ☐ Dot target ☐ Layered Target (please specify) ☐ Mass limited target ☐ Cone/Hohlraum ☐ Complex 3D (Cone/shell) ☐ Other (please specify)		☐ Single shot ☐ Part of a Cluster ☐ High-rep Rate Array ☐ Complex Array (e.g double foil) ☐ Nano-positioing wheel ☐ C-mount ☐ Tape target ☐ Other (please specify)		**Expected number of targets (shots) required**
Material		**Source**	☐ CLF Target Fabrication ☐ Other	**Other details:**
		Contact details		

Target Type 4 (please tick as required)		**Mounting**(please tick as required)		
☐ Proton Foil ☐ Simple Backlighter ☐ Foil 1-100um ☐ Thin foil 100-1000nm ☐ Ultra-thin foil <100nm ☐ Low density target ☐ Dot target ☐ Layered Target (please specify) ☐ Mass limited target ☐ Cone/Hohlraum ☐ Complex 3D (Cone/shell) ☐ Other (please specify)		☐ Single shot ☐ Part of a Cluster ☐ High-rep Rate Array ☐ Complex Array (e.g double foil) ☐ Nano-positioing wheel ☐ C-mount ☐ Tape target ☐ Other (please specify)		**Expected number of targets (shots) required**
Material		**Source**	☐ CLF Target Fabrication ☐ Other	**Other details:**
		Contact details		

Multi-target Geometry

Please supply a simple sketch (indicating critical dimensions) for any complicated or new requirements which RAL are requested to provide. Attach additional information on an extra sheet if necessary. If targets are to be provided by an external source please provide a contact so that the CLF target fabrication group can contact the fabricator to ensure that the target is compatible with the experimental design.

Part 2. Characterisation:

Target type 1	Details:
Target type 2	Details:
Target type 3	Details:
Target type 4	Details:

Part 3. Pinhole Requirements:

1	☐ Thomson pinhole ☐ Multi-pinhole (4 pinholes) ☐ Multi-pinhole (lead mount) ☐ Other (please specify)	Details (diameter, filtering of individual pinholes):
2	☐ Thomson pinhole ☐ Multi-pinhole (4 pinholes) ☐ Multi-pinhole (lead mount) ☐ Other (please specify)	Details (diameter, filtering of individual pinholes):
3	☐ Thomson pinhole ☐ Multi-pinhole (4 pinholes) ☐ Multi-pinhole (lead mount) ☐ Other (please specify)	Details (diameter, filtering of individual pinholes):

Part 4. Filters and Photocathodes:

1	☐ Flat field filters ☐ Photocathodes ☐ Multi-element filter ☐ Other (please specify)	Details (material, thickness, support):
2	☐ Flat field filters ☐ Photocathodes ☐ Multi-element filter ☐ Other (please specify)	Details (material, thickness, support):
3	☐ Flat field filters ☐ Photocathodes ☐ Multi-element filter ☐ Other (please specify)	Details (material, thickness, support):

Form T1a. Preliminary request for Gasses.

This form should be used to indicate the gas requests for the campaign. The gas pressures are indicated in Bar gauge (Barg) and Bar Absolute (Bar A). Bar gauge is the rating above atmospheric pressure, whereas Bar Absolute is the absolute rating. TAP is the only area that can accommodate pressures higher than 100Barg due to the gas line infrastructures in place.

Gas mixing is not currently carried out on-site. Pre-mixed bottles are generally sourced from our tendered gas supplier. Early specification and agreement will ensure gasses are delivered ahead of schedule and ensure there are no compatibility issues with the infrastructure.

The CLF does not currently provide capillary targets. All solenoids (CLF or user provided) must only be used within their certified parameters which includes gas type (flammable / non-flammable) and operating pressures.

Gas Type: (please tick as required)

	Pre-Mixed Gas	Hydrogen	Deuterium	Methane	Argon	Helium	Neon	Nitrogen	Xenon	Other	100-180 Bar gauge	50-100 Bar gauge	7-50 Bar gauge	1-7 Bar Gauge	0-1 Bar Absolute
Gas 1															
Gas 2															
Gas 3															
Gas 4															

Solenoid Requirements: (please tick as required)

Peter-Paul Solenoid	
Gas fill	
Capillary	
Gas filled target	
Other	

Form D1. Preliminary request for Diagnostics.

This form should be used to indicate the ideal diagnostics use for the experimental campaign. Conflicts and restrictions due to multiple experiments should be expected, and an early specification and agreement will allow the facility staff to identify these prior to scheduling in order to find solutions. Please be realistic regarding the number of diagnostics reserved.

This form is in 5 parts with most subdivided into further categories. Each part deals with separate diagnostic types (optical, x-ray, nuclear etc) and lists the primary CLF diagnostics available. The maximum number of diagnostics available in each category is listed.

When completing the form, please indicate the number of diagnostics required, and how many of these form the primary diagnostics requirement. Clearly Indicating the primary diagnostics will greatly aid the CLF in determining where diagnostics are required in order to achieve the main goals of the experiment. Try and be clear on which diagnostics are absolutely required to achieve the main goals and only mark these for primary diagnostics. Additional diagnostics can be requested through the planning cycle as more experimental detail is achieved, and as such you will not limit your experiment at this stage.

This list is kept as up-to-date as possible. Please state any further diagnostics not included here at the end of the form, including those expected to be brought by your own (or collaborating) institute.

An experimental layout should be included to indicate approximate location for diagnostics.

Form D1. Preliminary request for Diagnostics.

Part 1. Measurement & control: (please indicate number requested)

Equipment Type	Manufacturer	Model & Notes	Maximum number Available	Number Requested	Primary
Delay Generator	STANFORD RESEARCH SYSTEMS	SRS DG535 delay generator	6		
Oscilloscope	TEKTRONIX	500MHz-2.5GHz	6		
	LeCroy	4GHz	2		
	TEKTRONIX	DS6154C – 12.5GHz	3		
	LeCroy	WaveMaster 813Zi-B – 13GHz	4		
	TEKTRONIX	6804B - 8GHz	1		
	LeCroy	6GHz	1		
	LeCroy	350MHz	9		
Calorimeter	SCIENTECH	200mm diameter	2		
	Gentech	50x50 mm	10		
Image Plate Reader			2		
RCF Scanner	Nikon	Epson Expression 12000XL	1		
<100ps optical Diode			3		
B-dot EMP probe	Prodyn	B-24 with BIB-100G Balun	4		
d-dot EMP probe	Prodyn	FD-5C	4		

Part 2. Optical Diagnostics: (please indicate number requested)

2.1 - Scientific Cameras

Manufacturer	Model	Chip size	Pixel size	Notes	Maximum number Available	Number Requested	Primary
ANDOR	DV420-BU2	1024 x 255	26µm	Optical/UV Andor CCD Cameras	3		
ANDOR	DV420-BV	1024 x 256	26µm	Optical Andor CCD Cameras	1		
ANDOR	iXon	1024 x 1024	13µm	EMCCD Cameras	4		
ANDOR	NEO	2.5k x 2k	6.5µm	Optical/UV Andor CCD Cameras	8		
PICOS	PCO Edge Gold 5.5			sCMOS Camera	3		

2.2 - Streak Cameras

Manufacturer	Model	Notes	Maximum number Available	Number Requested	Primary
HAMAMATSU	C5680 / C10910	Long Pulse (full spectrum) 200ps-50ns sweep window	2		
HAMAMATSU	C7700-11 / C7700-01	High Dynamic Range, Sweep time 500ps-1ms	2		

2.4 - Spectrometers

Manufacturer	Model	Notes	Maximum number Available	Number Requested	Primary
ACTON	Spectrapro - 2300i	300mm *f* spectrometer	2		
ACTON	Spectrapro - 2750	750mm *f* spectrometer	1		
OCEAN OPTICS	Maya HR2000 pro HR 2000	Maya 2000 HR2000	3		
ANDOR	Shamrock + Newton	CCD-7264 / CCD-8499	2		
ANDOR	Shamrock + Idus	CCD-9804	1		
ANDOR	Shamrock 500 + Idus		1		
Avantes	ULS2048XL-EVO-UV/VIS	200-1160nm, slit 25um	3		
Avantes	ULS2048XL-EVO-NIR	600-1100, slit 25um	1		

Part 3. X-ray Diagnostics: (please indicate number requested)

3.1 - Scientific Cameras

Manufacturer	Model	Chip size	Pixel size	Notes	Maximum number Available	Number Requested	Primary
ANDOR	DX420-BN	1024x255	26x26µm	In Vacuum Camera	4		
ANDOR	DO420-BN	1024x255	26x26µm	On Vacuum Camera (1 with standard face, 1 with ICF face)	1		
Andor	iKon-L HF	2048x2048	13.5x13.5µm (10 lp/mm for scintillator)	150 µm CsI on 3mm fibre optic plate bonded to chip (10-100keV)	1		
Raptor Photonics	EA4240XV-BN-CL	2048x2048	13.5x13.5µm	In Vacuum Camera	2		
Raptor Photonics	EA4710XV-BNE-CL	1024x1024	13x13µm	In Vacuum Camera	1		

3.2 - Streak Cameras

Manufacturer	Model	Notes	Maximum number Available	Number Requested	Primary
Kentech	Low Mag	1 with Pixis direct CCD requiring 1s early camera reset. 100ps – 30ns window (approx.)	2		
Kentech	High Mag	100ps – 30ns window (approx.)	1		

3.3 - Spectrometers

Manufacturer	Model	Notes	Maximum number Available	Number Requested	Primary
FLATFIELD		2 1200 gratings, 1 2400 grating	2		
FLAT CRYSTAL	RAL Narrow Body		2		
FLAT CRYSTAL	RAL Wide Body		2		
Von hamos			1		
HOPG spectrometer			2		

Linear absorption spectrometer	10x2mm LYSO:Ce scintillators	5x2mm Tungsten filters, x-ray ~0.03-3 MeV	6		
Bremms cannon	2023 design (York)		3		

3.4 - Pinhole Cameras

Manufacturer	Notes	Maximum number Available	Number Requested	Primary
RAL standard	In-vacuum. Adaptors for single shot, 4-shot drum or CCD (may be limited due to EMP)	2		

Part 4. Pulsed lasers: (please indicate number requested)

Manufacturer & Model	Brief Specification	Notes	Maximum number Available	Number Requested	Primary
Minilite 2	20mJ max, 10Hz, 4ns	1 – 4th harmonic available from 1064nm	2		
Picoquant	50ps, 10Hz diode	Very low power, primarily for streak camera calibrations and equipment testing. 800-900nm (2) 400nm (1)	3		

Part 5. Nuclear and Particle Diagnostics: (please indicate number requested)

Detector	Notes	Maximum number Available	Number Requested	Primary
Sodium Iodide detector (NaI)	Scionix 2” diameter	4		
neutron detectors	EJ410 ~20cm diameter	5		
Electron spectrometers	Electromagnet (2 up to 300 MeV, 1 up to 1 GeV)	3		
Electron spectrometers	Permanent magnet (active or passive detector design)	3		
wedged ion spectrometer	choice of permanent magnets available	6		
High-energy ion spectrometer	Adjustable length diagnostic developed by QUB	4		
RCF stack - linear	4-position, max 2” pack	1		
RCF stack - “windmill”	4-position, max 2” pack	2		
RCF stack - carousel (3)	Compact 3-position, max 50mm pack	2		
RCF stack - carousel (5)	Compact 5-position, max 50mm pack	2		
RCF stack - carousel (10)	Compact 10-position, max 25mm pack	2		
TLD carousel	*Not transportable from R2 lab*	1		
coincidence detectors	*One with automated carousel & not transportable from R2 lab*	2		
Hamamatsu MCP		2		
Stanford 1.25KV PSU		7		
Stanford 5KV PSU		5		
Stanford 20KV PSU	(pair)	1		
ETPS NIM 5KV PSU - Oriel	typically has two PSU per unit	3		

Please provide a detailed description of the experimental layout and diagnostics.

Engineering layouts for the facilities are available on request.