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

**4.2 Other Gemini beam requirements** (please tick as required)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Apodised beam |  |  | Apodised beam |  |  |
| Split beam |  |  | Split beam |  |  |
| Pre-pulse |  |  | 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) | |  | |
|  | |  | | **Expected number of targets (shots) required** | |
| **Other details:** | |
| **Source** |  |
|  |  |
| **Contact details** |  |
| **Material** |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Target Type 2** (please tick as required) | | **Mounting**(please tick as required) | |  | |
|  | |  | | **Expected number of targets (shots) required** | |
| **Other details:** | |
| **Source** |  |
|  |  |
| **Contact details** |  |
| **Material** |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Target Type 3** (please tick as required) | | **Mounting**(please tick as required) | |  | |
|  | |  | | **Expected number of targets (shots) required** | |
| **Other details:** | |
| **Source** |  |
|  |  |
| **Contact details** |  |
| **Material** |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Target Type 4** (please tick as required) | | **Mounting**(please tick as required) | |  | |
|  | |  | | **Expected number of targets (shots) required** | |
| **Other details:** | |
| **Source** |  |
|  |  |
| **Contact details** |  |
| **Material** |  |

**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 |  | Details (diameter, filtering of individual pinholes): |
| 2 |  | Details (diameter, filtering of individual pinholes): |
| 3 |  | Details (diameter, filtering of individual pinholes): |

**Part 4. Filters and Photocathodes:**

|  |  |  |
| --- | --- | --- |
| 1 |  | Details (material, thickness, support): |
| 2 |  | Details (material, thickness, support): |
| 3 |  | 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.*