SPECIFICATION SHEET

SUPPLY, INSTALLATION AND COMMISSIONING OF AN "ULTRAFAST AND WAVELENGH TUNABLE MID-INFRARED LASER" FOR THE LABORATORY OF THE INSTITUT DE CIÈNCIES PHOTONIQUES, THROUGH AN OPEN PROCEDURE

FILE NUMBER: 2024.SU.017

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CLAUSE 1. Object of the contract

The purpose of this contract is the supply, installation and commissioning of an "ULTRAFAST AND WAVELENGH TUNABLE MID-INFRARED LASER" for ICFO's laboratory.

The types of items supplied are linked to the CPV (Common Public Procurement Vocabulary), **38000000-5** Laboratory, optical and precision equipment (except glasses).

CLAUSE 2. Needs to satisfy

We are building a quantum twisting optical microscope (QTOM) system at ICFO. The system will be a combination of quantum twisting microscope and mid-infrared laser. In the microscope, there is a tip and a sample, both covered with two-dimensional materials. They are brought into contact and mid-infrared laser will be shined into the contact interface. A photo-induced tunnelling current between them is then recorded. Additionally, the sample stage is continuously rotated and, as a result, a current map that is equivalent to the convolution of two-dimensional materials electronic structure and laser spectrum is obtained. This new type of scanning microscope can be applied to layered quantum materials such as metals, semiconductors, superconductors, topological insulators, Weyl semimetals and magnets. Due to the nature of the physics that will be studied, the QTOM needs to work with an ultrafast and wavelength tunable mid-infrared laser. Moreover, extremely wide wavelength range and high laser beam quality are necessary to record the very weak current signal as a function of the rotational angle. At ICFO, there is no such laser for QTOM equipment.

We are looking to purchase an ultrafast laser system that is in the mid-infrared range and wavelength tunable. The system should include:

1. A high power pump laser
2. Chiller unit for the pump laser
3. A tunable fiber-feedback optical parametric frequency converter
4. High power amplifier module for the frequency converter
5. Mid-infrared module

CLAUSE 3. Technical requirements

The system should guarantee:

- Tunable wavelength range covering 1.1-20 um
- Pulse width <500 fs
- Constant pulse duration and spectral bandwidth over the entire tuning range
- Repetition rate at 42 ± 1 MHz, changeable upon request
- Linewidth < 30 cm^{-1}
- Average power >8 W for the pump laser, >130 mW for the optical parametric frequency converter, > 600 mW for the high power amplifier module, >70 mW at 5 um, >20 mW at 10 um, and >0.5 mW at 20 um
- Power stability (RMS) <1% for the MIR module and <0.5% for other modules
- Passive spectral stability (RMS) <0.005% ($\frac{\sigma_\lambda}{\lambda} < 5 \cdot 10^{-5}$) over >4 hours
- Spectral power density drift <0.5%/h over 90% of optical spectrum
- Spectral reproducibility < 0.3 cm^{-1} over >4 hours
- Gaussian beam profile and beam waist ($1/e^2$ radius) <4.5 mm at 10 um
- Time-bandwidth product <0.45 (pump)
- Relative intensity noise <-160 dB/Hz at 300 kHz and above
- Field upgradable with fully integrated VIS (700-980 nm) module

The system should include:

- External power supply
- Electronic control unit with power measurement, performance monitoring and PC interface via ethernet and WIFI
- Software package: Fully automated wavelength control and performance monitoring. Automated set-and-repeat modality that enables precise (< 0.3 cm^{-1}) and rapid (<5 s) return to a previous system state without intermediate optimization. Compatible to Windows and Unix PCs with ethernet or WiFi interface. Simultaneous third party API control (python and LabVIEW)

Laser Dimensions:

- The laser system should be put on an optical table and takes space no more than 1.1m*0.5m*0.16m

CLAUSE 4. Power distributions and safety

- The system should be configured for EU (Spain) power grid (voltage, sockets, etc.) and be CE marked.
- The system should be protected against unexpected power cuts and, in that case, should be fully safe for the operators. A quick and easy turning on of the system has to be possible after a power cut.

CLAUSE 5. System layout and services

- The proposal should include a complete set of pictures, drawings and layouts of the system, including dimensions, location and details of the different components.
- The proposal **should include full installation and start-up requirements (Unpack all system components; Assembly; Run system to laser emission; Demonstrate frequency tunability; Demonstrate beam quality; Demonstrate power performance; During the installation process, instruction should be provided on proper procedures for operation and maintenance of the system)**, clearly specifying temperature, pressure, humidity, vibration level, etc, for the specific configuration of the offered system.
- 1 copy of the Operating and maintenance manuals must be delivered in English.

CLAUSE 6. Transportation, installation, start-up and training

- The proposal will include transportation to ICFO's facilities including insurance and all export/import and customs duties. **DAP incoterm will apply.**
- The system will be placed in the selected location by ICFO. Contract winner will cover all costs, organization and coordination of system placement, including any required specialized equipment or vehicle, and any required component disassembly and reassembly for system unloading and transportation inside the building to the target lab location.

CLAUSE 7. Warranty and Follow-on Support

- **1-year Full Warranty** on all parts and components of the system irrespective of the manufacturer. The warranty will include the replacement of any faulty or damaged part(s) during normal use of the system, no matter the manufacturer of the component(s). It will cover any cost related with the disassembly, transportation, reparation and re-assembly of the damaged component(s), including all travelling and living costs of the required service engineer(s). An on-site repair, or a justified alternative to reduce the

system down time to the minimum, will always be the first service option. A team of properly qualified and skilled service engineers will have to be available.

CLAUSE 8. Training

- Training of ICFO personnel in correct operating and maintenance procedures during the installation process must be included.

CLAUSE 9. Delivery and Installation Time

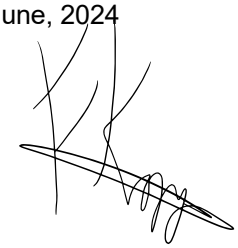
The system must be delivered and installed at ICFO within a maximum period of **6 months**.

Delivery time is defined as the time elapsed since the PO until the system delivery at ICFO facilities. It includes the manufacture of the system, the transportation, the installation and the acceptance test at ICFO's premises.

CLAUSE 9. Target price

- The target price for the system is 210.000,00 € (VAT excluded).
- Payment terms:
    - Payment upon order - 30% total price
    - Payment upon shipping - 70% total price

Castelldefels, 25th June, 2024



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