**Attachement 1 - Order description**

Order for electronic and optoelectronic components for the construction of a multichannel time-resolved spectroscopy system. The system must consist of 32 independent detection channels, which means that it requires:

A. 32 units of electronics for time correlated single photon counting (TCSPC),

B. 32 single-photon detectors with a power supply

C. PC unit

The detection system must allow for simultaneous acquisition of 32 distributions of time of flight of photons (DTOFs). 32 TCSPC units must be grouped and implemented in the form of modules (TCSPC MODULES) compatible with the 19 "RACK mounting system. The number of TCSPC MODULES must not exceed 4. MODULES must communicate with the PC unit via a USB or PCIExpress interface.

All 32 TCSPC channels (units) must be synchronized, i.e. all 32 distributions of time of flight of photons must be recorded at the same time stamp. In addition, the start of the acquisition of each DTOF for all 32 channels must be triggered using an external TTL signal (typically 10-20 Hz) to ensure synchronous registration of all DTOFs. It means that the acquisition must be independent of the PC's operating system's clock.  
32 single-photon photodetectors must be supplied in the form of 32 ready-to-use units with an output to connect directly to the TCSPC units. All 32 photodetectors units must be powered using a dedicated power supply connected to a single (or a 2 maximum) 230V AC power source. Overload protection must be implemented, what means that if the number of photons reaching the detector is too high, protection against overload will deactivate the detector, preventing its damage. The control, i.e. the reset of the protection and thus returning to the detector's functionality, must be carried out from the level of the PC unit. Functionality is required that all detectors can be reset at the same time.  
TCSPC MODULES (32 TCSPC units), 32 single-photon detectors must be compatible with each other enabling simultaneous, time correlated single photons counting for 32 channels with a maximum photon count-rate > 4 MHz. TCSPC MODULES and reset of detector protection against overload must be handled from the PC unit via the SOFTWARE provided by the Supplier. The Supplier also delivers a PC in a 19 "RACK. The functionality of the SOFTWARE must ensure:

* Acquisition of data for 32 TCSPC units simultaneously
* Possibility to modify the settings of data acquisition parameters for single TCSPC and all 32 TCSPC units
* Ability to display all DTOFs on-line, i.e. in the mode that allows adjusting the settings (this mode is not used to acquire data)
* Reset of overload protection of 32 detectors simultaneously

In addition, the Supplier will deliver multi-mode, pulsed sources of laser radiation. The number of light sources is 4 times 2 wavelengths λ1 and λ2 (a total of 8 light sources). The wavelength λ1 must be in the range 670 nm-730 nm, while the wavelength λ2 must be in the range 830 nm-850 nm. Each light source must be equipped with a system for coupling light into a fiber with a diameter of 400μm and NA=0.2. The optical power must be > 10 mW. List of components:

1. 32 TCSPC units implemented in the form of TCSPC MODULES
2. 32 single-photon detectors
3. Power supply unit for detectors (POWER MODULE)
4. A set of necessary accessories (wires, attenuators, etc.)
5. PC unit (PC in the RACK 19 '' case)
6. SOFTWARE
7. 8 pulsed laser light sources with a controller, power supply and fiber optic couplers

|  |  |  |  |
| --- | --- | --- | --- |
| Components of 32-channel time correlated single photon counting detecting system | | | |
|  | Technical parameter | | The required value of the technical parameter |
| **1. DETECTION SETUP** | | | |
| 1.1 | | Number of detection channel | 32 |
| 1.2 | | Number of TCSPC units | 32 |
| 1.3 | | Maximum number of TCSPC MODULES | 4 |
| 1.4 | | Connection of TCSPC MODULES with PC unit | USB lub PCIExpress |
| 1.5 | | TCSPC MODULES mounting | 19’’ RACK |
| 1.6 | | Time resolution (electronic) | < 12 ps |
| 1.7 | | Minimum acquisition time of single DTOF | < 25 ms |
| 1.8 | | Maximum countrate | > 4 MHz |
| 1.9 | | Number of single photon detectors | 32 |
| 1.10 | | 32 detectors power supply ( MODUŁ POWER) | Dedicated 32-channel power supply  or 2 dedicated 16-channel power supplies |
| 1.11 | | Spectral range of the detectors (minimum range) | 600-900nm |
| 1.12 | | Stability (shift of the maximum of instrumental response function (IRF) during the time of measurement) | < 10ps |
| 1.13 | | Stabilization time of the detecting system | < 30 minutes |
| 1.14 | | Diameter of an active detector area | ≥ 7 mm |
| 1.15 | | Full width at half maximum of the IRF (with full area of the cathode) | < 180 ps |
| 1.16 | | Overload protection of the detectors | YES |
| 1.17 | | Reset of overload protection of the detectors | SOFTWARE operated, functionality of resetting all detectors simultaneously must be implemented |
| **2. Laser light source EMITTING SETUP** | | | |
| 2.1 | | Repetition rate | >= 50MHz |
| 2.2 | | Number of pulsed laser light sources @ 1 | 4 |
| 2.3 | | Number of pulsed laser light sources @ 2 | 4 |
| 2.4 | | Wavelength 1 | From range 670 nm-730 nm |
| 2.5 | | Wavelength 2 | From range 830 nm-850 nm |
| 2.6 | | Optical power | > 10 mW |
| 2.7 | | Fiber coupler | YES (SMA or FC/APC @ fiber core400 m NA=0.2 |