Technical Specification for

A system for performing Photon Correlation Measurements and Spectroscopy

The system should consist of three main equipment/components:

1. Picosecond Pulsed laser
2. Single photon counters
3. Time-correlation single photon counter
4. Photon correlation analysis software

Following are **common requirements for all the items**:
1. All the necessary power cables, adapters (as needed for India) and any other data cables as needed for the basic operation of the equipment should be provided.
2. Software or demo code for basic plug and play operation of the equipment should be provided. More advanced software requirements listed the detailed specifications for each.
3. Drivers for control of the laser using standard programming languages such as LabView, C++, Python should be provided.
4. 1-year warranty should be provided for all the items. Longer warranty is preferred.
5. Detailed specification sheet and brochure for the models being quoted should be provided.
6. Vendor should have sold at least 10 units of each of the individual items (or closely related models). They should provide a list of at least 3 people to whom these have been supplied.
7. The vendor should have trained service professional available in India.

More **detailed required specifications for each of the part**s are given below:

Pulsed laser:
1. The laser unit should include the laser along with all the necessary drive electronics and temperature control/stabilization electronics.
2. Safety interlock and other features for safe operation should be provided.
3. Should be capable of both continuous wave (CW) and pulsed mode.
4. Center Wavelength: nominally 532 nm (520-550 nm range acceptable)
5. Power: ≥ 20 mW for CW mode and > 1 mW in Pulse mode
6. Pulse width (FWHM): < 100 ps
7. Max Pulse rate: > 50 MHz
8. Temperature stabilized operation should be available with better than 1 K stability.
9. CW mode linewidth: < 1 nm
10. Power stability: ≤ 1% RMS over 8 hr or longer time period.

Single Photon Counter
1. **Two single photon counters** are required and should be quoted.
2. Wavelength detection range: At least 400 nm- 700 nm. Greater range preferred.
3. Detection efficiency: > 30 % across the desired detection range
4. Timing resolution: < 50 ps
5. Max photon count rate: ≥ 10 Mcps
6. Dark count rate should be < 500 cps
7. Active temperature stabilization should be provided.

Multichannel Picosecond Event Timer | Time Correlation Single Photon Counting module

1. A time correlation single photon counting module is required with time tagging capabilities.
2. It should have 4 independent input channels and common sync channel.
3. Time resolution 10 ps or better is required.
4. Count rate up to 10 Mcps per channel.
5. Adjustable input delay for each channel with 1 ps resolution preferred.
6. Multi-stop capability preferred.
7. Should allow external synchronization signals for confocal.
8. Fluorescence lifetime imaging or other control events.

Photon Correlation Analysis Software

1. Specialized software capable of performing Antibunching (g(2)) measurements, coincidence counting, Fluorescence Correlation Spectroscopy, Fluorescence lifetime imaging, FRET microscopy and related photon correlation techniques should be provided.
2. It should be a 64-bit software to enable easier handling of large data sizes.

Shipment, Installation, and training

1. The vendor must provide with 2 weeks of the issue of the PO detailed instructions from preparing the lab space to install and operate the equipment. These can include space and power requirements, table/workbench details, temperature and humidity requirements, and any other crucial details. IITM will prepare the lab space for installation.
2. The vendor must provide complete installation and demonstration of the system at IIT Madras site, and training of at least three people.
   The following checklist will be used to verify complete installation:
   a. Successful demonstration of laser operation in both manual and computer control mode, including change of laser power, repetition rate and other key features.
   b. Successful demonstration of the photon counters using a software provided by the vendor, and measurement of the dark count rate.
   c. Successful working of the TCSPC unit