

CSIR - NATIONAL PHYSICAL LABORATORY

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From: Director, CSIR-NPL
Tender No. 14-VI/SP(1142)23PB/T-172

Dated: 29.12.2023

CORRIGENDUM

With reference to NPL's Global Tender ID: **2023_CSIR_737579_1**, Pre-Bid Conference (PBC) was concluded on 26.12.2023 for "**Ultra-stable Clock Laser with Low Expansion Cavity and Accessories**". Consequent upon the outcome of PBC, some changes have been made in the technical specification of captioned tender. Revised specifications are as follows:

Ultra-stable clock laser with low expansion cavity and accessories

a. Ultra-stable narrow linewidth laser to be used as a clock laser for an optical atomic clock (Quadrupole clock transition of $^{171}\text{Yb}^+$ ion); Laser locked to a high-finesse and low-expansion cavity.
1. Wavelength: ~ 435.5 nm
2. Linewidth: ≤ 1 Hz
3. Output Power: Two output needed. One is $\geq 20\text{mW}$ @ ~ 435.5 nm (at the output of a 10m long single-mode (SM) Polarization maintaining (PM) optical fiber after fiber induced noise cancellation and intensity stabilization for the experiment) and the other is ≥ 50 mW @ ~ 871 nm (at the output of a 30m long single-mode (SM) Polarization maintaining (PM) optical fiber after fiber induced noise cancellation and intensity stabilization for characterizing with respect to an optical frequency comb and other experiments)
4. Stability (@1s): $\leq 7 \times 10^{-15}$ with calibration certificate (either at 871nm or at 435.5 nm)
5. Operating ambient temperature and humidity: 20-24°C and 40 to 60%
6. Linear drift rate: ≤ 500 mHz/s
7. Auto relocking of laser to the desired cavity mode (in case the laser gets unlocked, due to some fluctuation).
8. Cavity drift removal system should be included

9. Two Fiber noise cancellation systems, as described in Point 3.
10. The final single frequency laser wavelength/frequency after the two fiber noise cancellation systems and the intensity stabilization should be $f(171\text{Yb}^+, \text{quadrupole}) = 688\,358\,979\,309\,308.24 \text{ Hz}$ $\lambda(171\text{Yb}^+) = 435\,517\,610.739\,687\,63 \text{ nm}$ with a tuneability of $\pm 20 \text{ MHz}$; Optics/Acousto-optic modulators/or any other system required should be provided to realize this solution
11. Suitable system for active and passive vibration isolation, acoustic and thermal isolation for cavity enclosures, required to achieve desired performances, be provided.
12. Suitable temperature controller and other required accessories for active stabilization of temperature of the system, required for achieving desired performances, should be provided.
13. Suitable vacuum vessel including vacuum systems and viewports for housing the cavity, should be provided
14. A system for remote monitoring and control of clock laser either through USB/LAN or other means should be provided.
15. The system should comply with Indian AC power supply system, i.e., $230 \pm 10 \text{ V}$ at 50 Hz .
16. A standard warranty of 1 year from the date of acceptance of satisfactory installation and operation.
17. On-site installation and training for operating the system as required should be provided by the OEM. OEM will also certify that they have already installed similar systems.
b. Comprehensive AMC for one year after the expiry of warranty period should be quoted separately

All other terms & conditions of said tender will remain the same.


Sr. Controller of Stores & Purchase

FORM TO BE FILLED BY IO WHILE CONVENING PRE-BID MEETING OF TSC.

File No. 14-VI/SP(1142)23PB/T-172

Date: 26/12/2023

Pre-bid Meeting (To be typed clearly by the I/O)

Name of Indentor. _ **Dr. SUBHASIS PANJA**

Indent No: PR6018052023 dated 12/09/2023

Item Description: Ultra-stable clock laser with low expansion cavity and accessories

Project No. **HCP-055**

Estimated Cost (in INR): **4,50,00,000.00**

No. of Budgetary Quotes: **Two**

(1) A pre-bid meeting of TSC was held on: **26th December 2023.**

(2) Following queries were raised by participating Bidders:

Name of the Firm	Queries Raised	Remarks, if any
1. M/S Western System on behalf of Menlo System GmbH	Informed that they will be able to fully comply the tender specifications. They were suggesting to get extended warranty instead of comprehensive AMC	NPL will consider their suggestion.
2. M/S Simco Global systems Pvt Ltd. On behalf of Toptica Photonics AG, Germany	Informed that they will also be able to fully comply the tender specifications. However, they wanted to know the detail about the copy bid documents, Integrity form and local content certificates mentioned in the tender documents	Sr. COSP explained in detail about all those document requirements.
3. M/S Aimil Ltd On behalf of M/S Stable Laser systems, USA	Informed that they will also be able to fully comply the tender specifications. Representative of M/S Aimil suggested that " it should be mentioned that the installation should be done by the OEM" . They also suggested that OEM should certify that they have already installed similar systems.	NPL will consider their suggestion.

FORM TO BE USED BY TSC FOR FINALISING PRE-BID MINUTES

File No. 14-VI/SP(1142)23PB/T-172

Date: 26/12/2023

TSC Minutes (To be typed clearly by the I/O)

Based on the Pre-bid meeting and recommendation of I/O, following changes have been made in the specifications:

Original Specifications	Final Specifications
<p>Ultra-stable narrow linewidth laser to be used as a clock laser for an optical atomic clock(Quadrupole clock transition of $^{171}\text{Yb}^+$ ion); Laser locked to a high-finesse and low-expansion cavity.</p> <ol style="list-style-type: none"> 1. Wavelength: ~ 435.5 nm 2. Linewidth: ≤ 1 Hz 3. Output Power: Two output needed. One is $\geq 20\text{mW}$ @ ~ 435.5 nm (at the output of a 10m long single-mode (SM) Polarization maintaining (PM) optical fiber after fiber induced noise cancellation and intensity stabilization for the experiment) and the other is ≥ 50 mW @ ~ 871 nm (at the output of a 30m long single-mode (SM) Polarization maintaining (PM) optical fiber after fiber induced noise cancellation and intensity stabilization for characterizing with respect to an optical frequency comb and other experiments) 4. Stability (@1s): $\leq 7 \times 10^{-15}$ with calibration certificate (either at 871nm or at 435.5 nm) 5. Operating ambient temperature and humidity : 20-24°C and 40 to 60% 6. Linear drift rate: ≤ 500 mHz/s 7. Auto relocking of laser to the desired cavity mode (in case the laser gets unlocked, due to some fluctuation). 8. Cavity drift removal system should be included 	<p>a. Ultra-stable narrow linewidth laser to be used as a clock laser for an optical atomic clock(Quadrupole clock transition of $^{171}\text{Yb}^+$ ion); Laser locked to a high-finesse and low-expansion cavity.</p> <ol style="list-style-type: none"> 1. Wavelength: ~ 435.5 nm 2. Linewidth: ≤ 1 Hz 3. Output Power: Two output needed. One is $\geq 20\text{mW}$ @ ~ 435.5 nm (at the output of a 10m long single-mode (SM) Polarization maintaining (PM) optical fiber after fiber induced noise cancellation and intensity stabilization for the experiment) and the other is ≥ 50 mW @ ~ 871 nm (at the output of a 30m long single-mode (SM) Polarization maintaining (PM) optical fiber after fiber induced noise cancellation and intensity stabilization for characterizing with respect to an optical frequency comb and other experiments) 4. Stability (@1s): $\leq 7 \times 10^{-15}$ with calibration certificate (either at 871nm or at 435.5 nm) 5. Operating ambient temperature and humidity : 20-24°C and 40 to 60% 6. Linear drift rate: ≤ 500 mHz/s 7. Auto relocking of laser to the desired cavity mode (in case the laser gets unlocked, due to some fluctuation). 8. Cavity drift removal system should be included 9. Two Fiber noise cancellation systems, as

<p>9. Two Fiber noise cancellation systems, as described in Point 3.</p> <p>10. The final single frequency laser wavelength/frequency after the two fiber noise cancellation systems and the intensity stabilization should be</p> <p>$f(171\text{Yb}^+, \text{quadrupole}) = 688\,358\,979\,309\,308.24\text{ Hz}$</p> <p>$\lambda(171\text{Yb}^+) = 435\,517\,610.739\,687\,63\text{ fm}$</p> <p>with a tunability of $\pm 20\text{ MHz}$; Optics/Acousto-optic modulators/or any other system required should be provided to realize this solution</p> <p>11. Suitable system for active and passive vibration isolation, acoustic and thermal isolation for cavity enclosures, required to achieve desired performances, be provided.</p> <p>12. Suitable temperature controller and other required accessories for active stabilization of temperature of the system, required for achieving desired performances, should be provided.</p> <p>13. Suitable vacuum vessel including vacuum systems and viewports for housing the cavity, should be provided</p> <p>14. A system for remote monitoring and control of clock laser either through USB/LAN or other means should be provided.</p> <p>15. The system should comply with Indian AC power supply system, i.e., $230\pm 10\text{ V}$ at 50 Hz.</p> <p>16. A standard warranty of 1 year from the date of acceptance of satisfactory installation and operation.</p> <p>17. On-site installation and training for operating the system as required should be provided.</p> <p>18. Additional Warranty for One years</p>	<p>described in Point 3.</p> <p>10. The final single frequency laser wavelength/frequency after the two fiber noise cancellation systems and the intensity stabilization should be</p> <p>$f(171\text{Yb}^+, \text{quadrupole}) = 688\,358\,979\,309\,308.24\text{ Hz}$</p> <p>$\lambda(171\text{Yb}^+) = 435\,517\,610.739\,687\,63\text{ fm}$</p> <p>with a tunability of $\pm 20\text{ MHz}$; Optics/Acousto-optic modulators/or any other system required should be provided to realize this solution</p> <p>11. Suitable system for active and passive vibration isolation, acoustic and thermal isolation for cavity enclosures, required to achieve desired performances, be provided.</p> <p>12. Suitable temperature controller and other required accessories for active stabilization of temperature of the system, required for achieving desired performances, should be provided.</p> <p>13. Suitable vacuum vessel including vacuum systems and viewports for housing the cavity, should be provided</p> <p>14. A system for remote monitoring and control of clock laser either through USB/LAN or other means should be provided.</p> <p>15. The system should comply with Indian AC power supply system, i.e., $230\pm 10\text{ V}$ at 50 Hz.</p> <p>16. A standard warranty of 1 year from the date of acceptance of satisfactory installation and operation.</p> <p>17. On-site installation and training for operating the system as required should be provided by the OEM. OEM will also certify that they have already installed similar systems.</p> <p>b. Comprehensive AMC for one year after the expiry of warranty period should be quoted separately</p>
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The file is forwarded to Purchase Section for uploading the final specifications and TSC minutes on the website and CPPP Portal.

Declaration: We hereby declare that we have no conflict of interest with any of the bidder in this tender