

INTER UNIVERSITY ACCELERATOR CENTRE

ARUNA ASAF ALI MARG

POST BOX NO: 10502

NEW DELHI-110067.

NOTICE INVITING TENDER NO. IUAC/NIT/06/BKS/2018-19

Name of the work: - : Supply, Installation, Testing and Commissioning of Low Level RF (LLRF) system for 2860 MHz normal conducting copper RF photocathode Gun.

Estimated Value: - : 120,000 USD (~ 80 Lakhs INR)

Earnest Money Deposit (EMD)*: - : 2,400 USD (~1.62 Lakhs INR)

***Bidders registered with NSIC and Foreign Bidders quoting directly are exempted from paying EMD.**

Last Date and Time of Submission of

Tender : 03/08/2018----- at 3.00 p.m.

Date & Time for opening of Tender : 03/08/2018----- at 3.30 p.m.

(Technical bid part-A)

Date & Time for opening of price bid : Will be intimated later on to technically

(Part-B) qualified bidders.

**Address for submission of tender : Administrative Officer(S&P),
Inter-University Accelerator Centre
Aruna Asaf Ali Marg
Post Box: 10 502
New Delhi - 110067**

Place of Opening of the Tender : Inter-University Accelerator Centre

GENERAL CONDITIONS OF TENDER:

- 1. Submission of Tender:** Tenders should be submitted in sealed envelope in two Parts separately, i.e. "Technical bid" (Part-A) and "Price bid" (Part-B). Both the parts should be further sealed in an envelope super-scribing NIT No & name of work, due date for opening, bidders name & address. The tender duly filled in may be sent to above mentioned address either by post or hand delivered in the **tender box kept in the area near west side entrance, after ensuring that due entries are made in the register kept at the counter.** It should not be handed over to any employee of the Centre. **No tender shall be accepted later than the time schedule specified above.**

Any clarification/amendments/corrigenda etc. to NIT will only be available on website: www.iuac.res.in

- 2. Technical Bid (Part-A) :** In this, the bidder should submit his company profile, organizational setup, credentials, and copies of successfully executed work orders for reputed laboratories during the last five years. No deviations in respect of NIT conditions are acceptable. **The bidders are required to attach entire NIT (except for the price bid part) duly signed & stamped as a token of acceptance to the NIT conditions with this bid. The following specific conditions are essential for pre-qualification:-**

Entire NIT (except Price bid) duly signed & stamped by the bidder.

The bidder must be an internationally reputed firm/company/manufacture or their representative of Low Level RF system for RF accelerators, who has supplied similar type LLRF system to the internationally reputed laboratories worldwide and in India and carried out similar work in the laboratories worldwide.

The company should supply the complete LLRF system for an accelerator facility as listed in the scope of work. Partial quotation for the individual subsystems will not be accepted. The company should attach a brief justification note to ascertain their capability criteria to undertake the order.

The list of users who have used similar item and model/make along with their name, E-mail address, Institute address & contact numbers should be submitted with the

quotation. If the identical or similar equipment have been supplied to other Laboratory/Institute in India/Abroad, the details of such supplies for the preceding five years must be given together with the prices eventually or finally paid. Copies of work orders during the last five years should be included. No deviations from the technical specifications listed in the annexure A will ordinarily be permitted. However, the Centre reserves the right of final decision regarding acceptable technical specifications.

3. **Price Bid (Part-B) :** In this bid, the bidder is required to quote the FOB price of item along with the break up as provided in Annexure C (Part I) for the works mentioned in the scope of work & technical specifications. The bidders should quote unconditional rates, neatly written without any overwriting and duly signed & stamped on all pages. The bidder may have to provide a certificate with the price bid mentioning that the price quoted by them is not higher than that the price quoted by them to other laboratories/institutes for similar product during last year.
4. **Scope Of work/supply:** Supply, Installation and testing of a Low level RF (LLRF) system for the operation of a 2860 MHz S –band Normal conducting copper RF photocathode gun for Delhi Light Source as per detailed technical specification and guidelines mentioned in NIT as **Annexure A**.
5. **Validity of Tender:** The prices must be valid for a period of **six months** from the date of opening of the quotation. No escalation of cost will be acceptable in any condition after opening of tender.
6. **Escalation:** No escalation over and above items rates quoted by the bidder shall be paid during the execution of contract.
7. **Pre installation requirements:**–Pre installation requirements like Power Supply, arrangement of rack, cooling requirement, temperature or humidity control or any other essential requirements which are to be kept ready/completed by IUAC before supply and installation of equipment, must be informed by the bidder clearly in their quotation to avoid any delay in Installation & Commissioning of equipment. Operating conditions and environment should clearly be mentioned.
8. **Inspection:-** The consignment shall be opened in presence of company's representative and inspection of the system will be done by IUAC technical

experts/scientists. In case company's representative is not available, the inspection will be done by IUAC team and discrepancy will be intimated to the supplier accordingly. All short supplies will be arranged by the supplier on its own. In case of receipt material in damaged or defective condition, the supplier will have to arrange the replacement of goods free of cost.

- 9. Installation/commissioning:-** The equipment must be installed/commissioned and demonstrated by the supplier at IUAC within a suitable time period on a mutually agreed basis after delivery of goods at IUAC and the same will be put under operation to the satisfaction of the team of experts constituted by IUAC who will test the performance of the equipment. The system will be accepted after the testing and no separate charges for installation etc. will be paid to the party beyond the quoted prices. Detailed specifications are enclosed with this NIT as Annexure A.
- 10. Correspondence:** All the correspondence in respect of tender/contractual obligation shall be made to the Admin. Officer (S&P), Inter-University Accelerator Centre, Aruna Asaf Ali Marg, New Delhi-110067 E-mail: joseph@iuac.res.in, Ph. +91-11-24126018, 24126022,
- 11. Terms of Payment:** L/C will be opened for 100 % of FOB value after receipt of acceptance of order from successful bidder. 70% of payment will be released against presentation of complete shipping documents. Balance 20% of order value shall be released after satisfactory installation, commissioning and testing of the equipment. Remaining 10% will be released after the warranty period OR against a Performance Bank Guarantee equivalent to 10% value and valid for the warranty period plus two months.
- 12. Post Warranty Period:** Extended warranty for a period of five years of post-warranty should be offered. During extended warranty, it should be specified that who will be the authorized personnel for servicing/maintenance etc. The response time for attending a fault should be within 3 days in case of Indian agent and 2 weeks in case of foreign workers. In such cases the supplier will pay the travel, lodging, transport of faulty parts etc. charges.
- 13. Manpower Training:** IUAC Scientist/Engineers will be trained at supplier's site and at IUAC. The personnel will witness and participate in the complete process of assembly,

system integration and testing of various sub system up to the final acceptance test. The detailed schedule time schedule needs to be conveyed by the supplier well in advance. The cost of training of the IUAC personnel at the site of the company including their travel by economy class, accommodation etc. will be taken care by IUAC.

14. Spares: Supplier should quote separately as option for spares required for trouble free operation of the LLRF system round the clock for 5 years. Some of the major spares are should be listed along with financial quote. All the additional spare item cost will not be included for comparative purpose.

15. Documents and Manual:

- i. Upon delivery of the LLRF system to IUAC, two sets of as built, signed, final prints of Electrical assembly and testing of systems shall be supplied by the vendor. These prints shall be made to the highest professional standards. All drawings shall also be delivered on CD/pen drive.
- ii. Upon delivery of the LLRF system to IUAC, two copies of the final parts list shall be supplied by the vendor. It shall also include a recommended critical spare parts list and test routine/schedule for such spares if they are to be stored. The data shall include current unit price and supplier of all component parts. All parts lists shall also be delivered on CD in either MS Word or MS Excel format.
- iii. Upon delivery the vendor should provide the guarantee documents mentioning all the terms and conditions in details.
- iv. All the information along with all test results, technical descriptions, data sheets shall be supplied in a bound design and operations manual.
- v. Set of documents must include operating manuals, safety manuals, periodic maintenance, troubleshooting manuals and maintenance procedure.
- vi. Any other documentation necessary for safe and reliable operation of the equipment should also be supplied. Two sets of the manual should be provided without additional cost.

16. Software and application:

All the software installations required for operation of the LLRF system will be done at IUAC. All the application and development software including OS, drivers etc. with required license with installable media (if applicable) should be supplied.

17. Final Acceptance: The final acceptance of the system is defined as successful completion of shipment, installation and acceptance tests at IUAC to substantiate compliance with the specification mentioned in annexure A. Complete system with all the accessories and spare parts should reach to IUAC safely with all the mentioned warranty intact.

18. Guarantee/ Quality Assurance

1. The Vendor shall furnish a manufacturing plan and acceptance test procedures to be approved by IUAC. Approval by IUAC shall not release the Vendor from his responsibility for conceptual design, manufacturing, or any other mistakes committed in the fabrication of the LLRF system.
2. All purchased articles from subcontractors or manufacturers released for inclusion in this LLRF system shall be clearly identified to indicate conformance to Vendor's receiving inspection.
3. The bidder should guarantee for the works/items executed/supplied by him from the manufacturing/engineering defect and bad material/workmanship for a period of at least one year from the date of successful installation at the IUAC. During this period if any replacement of items and/or repairs/rectification is needed, he shall make the same free of cost.
4. Only calibrated test equipment shall be used. Copies of the test data sheets shall include lists of the instruments used to perform the tests and the calibration due date of each instrument.
5. The Vendor shall establish those controls and processes necessary to ensure uniformity of all deliverable articles. All controls, inspections, tests and quality provisions established during development and pre-production tests shall be indicated on the applicable drawing and shall be performed on each deliverable article.
6. All units and parts of the equipment shall be properly packaged and delivered in an undamaged condition to IUAC.

19. Force Majeure: IUAC may grant an extension of time limit set for the completion of the work in case timely completion of the work is delayed by force majeure beyond the supplier's control. Force majeure is defined an event of effect that cannot reasonably be anticipated such as acts of God (like earthquakes, floods, tsunami etc.), the direct and

indirect consequences of wars (declared or undeclared), national emergencies, civil commotions and strikes (only those which exceeds a duration of ten continuous days) at successful Tenderer's factory. Apart from the extension of the time limit, force majeure does not entitle the successful Tenderer to any relaxation or to any compensation of damage or loss suffered.

- 20. Liquidated damages:** In case the delivery of the listed items is delayed beyond the specified delivery period for reasons attributable to the supplier, deductions on account of liquidated damages @ **0.5 %** per week of the total order value will be deducted subject to maximum 5% of the total order.
- 21. IUAC reserves the right** to reject any or all the tenders in full or in part without assigning any reasons whatsoever, and the decision of the Centre in this regard will be binding on all the bidders. Tenders not complying with any of the provisions stated in this tender document are liable to be rejected. **Director, IUAC reserves the right to accept or reject any tender without assigning any reason and does not bind himself to accept the lowest tender.**
- 22. This contract shall be governed by the Indian laws. Any dispute arising out of this contract will be subjected to jurisdiction of New Delhi/Delhi.**

Accepted
(Signature of bidder)

Annexure A

Specification of Low Level RF System (LLRF for S-band RF cavity at 2860 MHz) for Delhi Light Source (DLS) at IUAC

Sl. No.		
1	<p>Low Level RF System with following features:</p> <ul style="list-style-type: none"> • Completely modular system with separate RF and baseband sections/boards. • Provision for direct input of Master Oscillator signal from Reference signal generator. • Trigger input for synchronization with LASER bunches. Overall phase adjustment control to an arbitrary value within 360 deg. • Performance Metrics <ul style="list-style-type: none"> ○ RF Frequency : 2860 MHz ○ IF Frequency : Up to 50 MHz ○ Amplitude Stability : 0.1 % RMS ○ Phase Stability : 0.1 degree RMS 	<p>As per Table 1 Table 2 and Table</p>
2	Clock distribution system with operational frequency 2860 MHz and 130 MHz with at least two synchronized output options.	<p>Table 3 and Table 4</p>

Complete assembly to be of following modules:

Analog RF board (Front End, and Back End)

Table-1. Required major specification of Analog Board

Sl.	Parameter	Desired Value	Offered Value
Analog Front End			
1	Master Oscillator IN	Within -20 to +20 dBm, 2860 MHz	
2	RF In Reference In	Upto +20 dBm (max), 2860 MHz	

	Forward In Reflected In Pick-Up In		
3	IF Out Reference In Forward In Reflected In Pick-Up In	Typical 0 dBm Max +10 dBm @ Upto 50 MHz	

Analog system must be supplied with:

- Proper, well shielded connecting RF cables Shielded RF cables between front end and processing unit included
- Fan based / water based cooling provisions.
- Error state or Alert state indication.
- Power indication.
- Hardware interlocks.

Digital Baseband Board (digital processor)

Table-2. Required major specification of Digital Board

Sl.	Parameter	Desired Value	Offered Value
1	IF In Reference In Forward In Reflected In Pick-Up In	Typical 0 dBm Max +10 dBm @ Up to 50 MHz	
2	Clock In	Max +10 dBm (for ADC/DAC as per sample rates)	
3	TRIGGER In	Synchronized/Generated by Delay Generator	
4	Interlock In/Out	+24 V	

Digital system must be supplied with:

- FPGA based system
- On board high capacity DDR2/DDR3/DDR4 RAM and FLASH memory boot-up
- Proper signal conditioning

- Standalone PXI/PCI Express or VME bus interface
- TCP and/or USB connection interface (front)
- EPICS driver for control with GUI software
- Provision for FPGA user programmability
- Proper Fan based cooling arrangement

Table-3 Power Supply Considerations:

Sl.	Parameter	Desired Value	Offered Value
1	Power Supply	230 V AC +/- 10%, 15 A (Max)	
2	Power Consumption	As per design	
3	Operating Environment	Temperature: 20 °C – 25 °C Relative Humidity: < 80 %	

Table-4 Required major specification of Clock Distribution System

Sl.	Parameter	Desired Value	Offered Value
1	RF Output @ 130 MHz with a given RF input @2860 MHz, 0 dBm	Max +10 dBm	
2	Timing Jitter Phase Jitter Internal noise	200fs (Max. Additive) Max. 0.05 Degree Less than -80dBc/Hz at 10 Hz offset	
3	REF OUT	For Synchronization [Mention Frequency Range]	

Important notes about the system:

1. Complete system assembly must be compatible to 19 inch rack mount and modular in nature.
2. Appropriate test points and proper test mechanism/manual must be provided.
3. Standard interfaces like USB, LAN should be available.
4. Hardware reference manual for operation, maintenance, and control of equipment should be provided.
5. Factory based Calibration and Test Report must be provided.
6. Hardware Warranty and life cycle of devices with upgrade options, terms and conditions must be clearly mentioned.
7. In-situ installation, test, and training must be provided.

Annexure B

Price Bid for Low Level RF System (LLRF for S-band RF cavity at 2860 MHz) for Delhi Light Source (DLS) at IUAC

Sl. No.	Items	FOB Price in USD/Euro
1.	Complete Low Level RF System consisting of 2860 MHz digital LLRF board with Analog front and Back end and digital base band board.	
2.	Reference distribution system with 2860 MHz RF input and 130MHz Clock output	
3.	Commissioning, Training and Site Acceptance Test	
4.	Cost of Spare Parts, cables etc. (break up can be provided in separate sheet)	
5.	Extended warranty (5 Years beyond normal warranty)	
	Total	