THE UNIVERSITY OF BURDWAN

Prof. Tafajel Hossain
Registrar
(Officiating)

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Notice Inviting Tender(3rd call)

Tender Ref. No: BU/PHYS/FIST/01/2019A/1 Date: 10/01/2020

E-tenders are hereby invited for the item as per detailed specifications from the Original Equipment Manufacturer (OEM) or their authorized representatives in India for supply and installation of "**Cryogen-free Physical Properties Measurement System (PPMS) with Vibrating Sample Magnetometer (VSM)**" for research project sponsored by Department of Science and Technology (Govt. of India) under departmental FIST (Level 2) programme [Grant no: SR/FST/PS-II/2018/52(C)] at Department of Physics, The University of Burdwan.

The tender must be submitted through **on line only and must be addressed to-**

Professor Udit Chatterjee
Principal Investigator, DST-FIST Project
Department of Physics, The University of Burdwan
Golapbag, Burdwan 713 104, West Bengal, INDIA

1. For e-filing, intending bidder may download the e-tender documents from the website **https://wbtenders.gov.in** directly with the help of Digital Signature Certificate.
2. Bid shall remain valid for a period not less than 60 (*sixty*) days from the last date of submission of Financial Bid.
3. All the prices must be quoted in Foreign Currency (for imported items) & INR for local items.
4. Both **Technical Bid** and **Financial Bid** are to be submitted concurrently duly digitally signed in the website https://wbtenders.gov.in within the closing date of online submission.
5. The **FINANCIAL OFFER** of the prospective bidder will be considered only if the specification of the bidder is found qualified by the Project Purchase Committee. The decision of the Project Purchase Committee will be final and absolute in this respect.
    a) Terms & Conditions like, Insurance, Mode of payment, Validity period, Warranty and Delivery period must be mentioned and to be submitted on firm's letter head mentioning the following :

        i) Name and address of the Company including Telephone no., FAX no., e-mail address and web-site (if any).
        ii) Contact person - Name, mobile number, email address
        iii) Banker's name and address in details

    b) Detailed Technical specifications **complying those given in ANNEXURE-I**.
    c) Full Specifications, Make, Model, Brochure/Leaflets/Technical Information of the item(s) should be given while quoting the rates in the bid.
    d) In case of authorized dealers, OEM authorization mentioning the NIT number is needed to be submitted by the dealer.

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e) The OEM must have experience of manufacturing for at least last 10 years or more which should be given as undertaking from the OEM in writing and is to be submitted along with the tender documents
f) The accessories quoted by every bidder should be OEM make and not locally sourced; if locally sourced accessories are quoted, every such accessory must be duly certified by the OEM for use in the supplied major equipment. If found otherwise during supply then order will be cancelled
g) Experience and credential documents including copies of Orders towards supply of Govt /Govt undertaking organizations/ agencies are to be submitted along with the technical bid
h) Any other relevant documents

6. The **Financial proposal** should contain the Bill of quantities (BOQ) in one folder. The bidder has to download the BOQ and quote the rate online in the space marked for quoting rate in the BOQ and upload the document virus scanned & Digitally Signed by the bidder.
7. The Project Purchase Committee reserves the right to accept or reject any bid and to cancel the Bidding processes and reject all Bids at any time prior to the award of Contract without thereby incurring any liability to the affected Bidder or Bidders or any obligation to inform the affected Bidder or Bidders of the ground for Purchase Committee's action.
8. The Bidder whose bid would be accepted will be notified.
9. The final price of the instrument /equipment must include the other charges like packaging, forwarding, freight, transportation charges etc (whenever the prices are quoted on Ex-Work/FOB/FCA basis).
10. Name and address of the Foreign Principal (OEM) and their Email and Fax No. must be clearly mentioned in the offer. The purchase order will be placed to the OEM only.
11. The material should be dispatched duly insured against theft, loss or breakage during transit and the rates chargeable for insurance may invariably be quoted separately. The insurance shall be for an amount equal to 110% of the CIF value or CIP value of the contract from within "warehouse to warehouse (final destination)" on all risk basis including strikes, riots, and civil commotion.
12. The University of Burdwan is registered with Department of Scientific and Industrial Research (DSIR) for the purposes availing Customs duty exemption in terms of Government Notification and Central Excise Duty Exemption in terms of Government Notification.
13. Payment will be made on bill basis after the receipt of the item in good condition, its satisfactory installation and commissioning at our site by e-payment. In case of Import, payment shall be made through Letter of Credit (L/C) /Wire transfer/Foreign Demand Draft. The bidder has to follow the terms and conditions laid down in the L/C.
14. The warranty shall remain valid for minimum twelve (12) months from the date of satisfactory installation and commissioning at our site or thirty months (30) after the date of shipment from the port or place of loading in the country of origin whichever period concludes earlier.
15. Rate should be given both in words and figures clearly in the quotation. If there is any discrepancy between the words and figures, the amount in words shall prevail, unless the amount

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expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to above.

16. The shipment must be in the name of "The Registrar, The University of Burdwan, Rajbati, Burdwan, 713104, West Bengal, India".
17. The last date and time for receiving complete bids shall be strictly adhered to and no offer received after the due date shall be considered. Delayed/Late Tenders will not be considered at all. The University of Burdwan will not be responsible for any loss in transit.
18. The acceptance of quotation will rest with the Principal Investigator of the project who does not bind himself to accept the lowest quotation and reserves the right to reject, or partially accept any or all the quotations received without assigning any reason.

19. Date and Time Schedule :

1.	Date of uploading of N.I.T. & other Documents (On line) (Publishing Date)	13.01.2020
2.	Documents download start date (On line)	13.01.2020 (09:00 a.m.)
3.	Documents download end date (On line)	20.01.2020 (04:00 p.m.)
4.	Bid submission start date (On line)	13.01.2020
5.	Bid Submission closing date (On line)	20.01.2020
6.	Bid opening date for Technical Proposals (On line)	22.01.2020
7.	Date of uploading list for Technically Qualified Bidder (On line)	To be notified
8.	Date for opening of Financial Proposal (On line)	To be notified

REGISTRAR
The University of Burdwan

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Tender Notice No: **BU/PHYS/FIST/01/2019A/1** dated 10.01.2020: **ANNEXURE I**

A cryogen-free Physical Properties Measurement System (PPMS), operative over a wide range of temperature and magnetic field. The system must be fully automated, computer controlled and user-friendly. The instrument must be multi-functional, *i.e.*, capable of measuring magnetic, magneto-electric and magneto-thermal properties on bulk, powdered, thin film and single crystal materials. Finally, the system must be a proven one, *i.e.*, the performance of the system must be acknowledged by a significant number of users.

Detailed Specifications:

Sl. No.	System/Components/ Operation	Description	Complied (Yes/No	Remark (if any)
1.	**Cryogen-free**	System should be fully cryogen-free, i.e., no requirement of liquid Helium and/or liquid Nitrogen at any point of time.		
2.	**Cryo-cooler**	a) Single 2-stage Pulse Tube Cryocooler for cooling Superconducting Magnet and Cryostat assembly. b) Cryocooler should not be mounted in vacuum or not be coupled to any cryostat components via solid links. Cyrocooler should reside in helium gas within the cryogenic tank.		
3.	**Start-up operation**	Helium gas requirement for its fully automated start-up and operation must be small amount.		
4.	**Computer controlled Helium gas flow**	Any Liquid Helium and/or cold Helium gas flow into the sample chamber or to any		

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		other parts within the system, along with all low temperature operations must be handled in a fully automated way through electronic and computer controls.		
5.	**Fully automated system**	The system should NOT have any manual control in the entire operation of the system.		
6.	**Electronic Communication**	CAN (Controller Area Network) is preferred over GPIB interfaces as our data is needed by more than one location and system-wise data consistency is necessary.		
7.	**Sample space**	The system must have a large temperature controlled region, or sample chamber, that can either be under vacuum or presence of various exchange gases.		
8.	**Superconducting Magnet**	a) ± 9 Tesla field strength (longitudinal field). b) Sweep rate: Up to 200 Oe/sec. c) Field Homogeneity: ± 0.01 % over 3 cm on axis or better. d) Field Stability: 1-2 ppm/hr. e) Magnet has to be cooled by solid conduction without any liquid helium. f) The Initial cool-down time for the base system to 1.9K should be ≤ 16 hours. g) Magnet ramping should not affect the temperature stability.		

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		h) Magnet controlling software should monitor the temperature of the magnet and the cryostat at various locations to ensure proper operation of the magnet system. i) Bi-polar power supply with over voltage protection must be provided. j) Thermometer must be placed directly on the magnet. k) Automatic discharge of the magnet should occur if the cryocooler system fails (For example, due to water chiller failure). l) Provision must be there for the following operating modes: Linear, Oscillating, No Overshoot. There should be no overshoot in the field or the tolerable overshoot (to be specified for various field strengths) in "No Overshoot" mode. m) A built in magnetic shield must be there to maintain 5 gauss line for distance < 30 cm from the surface of the cryostat cabinet, allowing the system to be installed closer to other sensitive instrument for better lab space utilization (Kindly provide data). n) Magnet should be protected from quench.		
9.	**Temperature Control System**	a) Temperature control system should be efficient for continuous low temperature operation. All the operations must be		

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		fully automated without user intervention. Dual Helium impedance design is preferred over control by mechanical needle-valve. b) The system should enable cooling of samples from the highest temperature to the lowest, at the highest specified cooling rate at any given magnetic field up to ±9 T, without affecting the system-performance including the heating of the magnet. The same procedure should hold good for heating of the samples as well. c) System should have a sophisticated temperature control, so that it provides seamless transition between high temperature (400 K) with minimal cooling power needs; intermediate temperature with rapid slewing and large cooling needs; stable operation near the base temperature (< 1.9K) with cooling provided by the evaporation of liquid helium. d) The sample chamber has to be sealed for controllable sample environment (static Helium gas/vacuum). e) Temperature range: 1.9 - 400 K with milli-Kelvin stability and accuracy. f) Temperature stability: At least ± 0.5 % for T < 10 K and ± 0.05 % for T > 10 K irrespective of the magnitude of the applied magnetic field.		

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		g) Temperature of 1.9 K for the samples must be achieved from room temperature with a fast cooling not more than 45 minutes. Sweeps through 4.2 K are smooth and monotonic on cooling and warming sequences. h) Accuracy: ± 1% and sweeping rate 0.01 to 30 K/min irrespective of the magnitude of applied magnetic field. i) Temperature control should be fully automated. j) Vendor should provide Temperature Control architechture. k) Various modes of Fast settle, No overshoot, and sweep mode must be given in details. l) Required thermometers and heaters must be provided to manage the temperature gradients and to ensure smooth temperature control throughout the accessible temperature range.		
10.	**Vacuum pumps and fittings**	a) Vacuum pumps and fittings along with the vacuum gauges, meter and standard vacuum coupling essential for the un-interrupted functioning of the instrument for various measurements must be supplied. b) All pumps must be dry pumps. The system should not include any oil based pumps. c) The system should have an		

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		integrated cryopump and necessary vacuum gauges for controlling the sample environment. This fully integrated option should allow changing the chamber environment during a programmed sequence or script. The Cryopump should be able to achieve a pressure less than 10^{-4} Torr within the sample chamber in a time span of less than 10 minutes. Turbo Molecular pumps for high vacuum application is not acceptable.		
11.	**Data acquisition and analysis**	a) Licensed windows based operating software and State-of-the-art computer control system compatible with the measurement options should be supplied. The software should be able to run the various measurement options automatically and in different modes. There must be a scope to control the external instruments by using different programs for the experiments designed by users. b) Temperature, field control and the measurement procedure should be fully automated. The software will control all the aspects of the instrument's electronics, hardware, gas handling, data acquisition and data analysis. The software will include a comprehensive sequence		

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		editor for setting up unattended measurement runs. Each user shall be able to set their own measurement sequences and data files so that the experimental set-up and the data remain safe on a multi-user system. c) The software must allow the users to control remotely and monitor experiments over any internet connection. d) System should have capability to control temperature and magnetic field from external programs like lab view or any other third party software.		
12.	**Measuring parameters /Measurement**	a) Dc magnetization, b) 4-wire & 2-wire resistivity, Hall effect measurement, I-V characteristics, differential resistance measurement (dV/dI vs. I or dV/dI vs V). c) Thermal conductivity, Seebeck coefficient, electrical resistivity, Thermopower–Figure of merit.		
13.	**DC Magnetization**	a) Supported Temperature Range: ≤ 1.9 – 400K (Specify and provide supporting data indicating the complete temperature range for DC Magnetization) b) VSM must utilize the linear motor to vibrate the		

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		sample. Inefficient voice-coil design is not accepted. Vendor must mention the details of the sample vibration technique used by the OEM. c) VSM measurement data of sample for the temperature range of 1.9 – 400 K with 1 second averaging, measured during both cooling and heating must be provided by the bidders with the offer. Data files may be asked during technical evaluation. d) VSM system must perform rapid, completely automated centering operations. There should not be any need to perform manual adjustments to center the sample. Vendor must specify the centering process-details and travel range of the motor. e) Coil-set bore should be less than 7 mm. A thermometer should be mounted on the VSM coil to measure the accurate temperature during the measurement. f) Magnetic Field: ± 9 Tesla. g) VSM Oscillation Frequency (calibrated): 40 Hz (Range of 10 to 60 Hz or wider). h) Maximum amplitude should be at least 5 mm. i) RMS sensitivity: 6×10^{-7} emu or 0.5%, whichever is		

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		larger at zero field and < 2×10^{-6} emu with one second averaging or 0.5% below 400 K. j) Accuracy: 0.5% using standard calibrated sample. k) Sample Holders: Suitable sample holders for powder, pellet and thin film. l) Sample mounting station. m) NIST based samples must be provided for calibration of magnetic moment at low and high magnetic fields/ temperatures. n) At least 5 SCI publications should be attached in support of the temperature range, accuracy for DC Magnetisation.		
14.	**Magneto-electrical Properties**	a) Temperature Range: 1.9 – 400 K. b) Magnetic Field: ±9 Tesla. c) Should have two built-in independent sources and meters so that two measurement channels are truly independent. d) 4-wire & 2-wire resistivity and simultaneous Hall effect measurement, I-V characteristics and differential resistance measurement (dV/dI vs. I or dV/dI vs V). e) Current range: 3 nA to 5 mA. f) In addition to standard mode (4-wire resistance up 10 MΩ), there should be high impedance mode - 2-		

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		wire resistance measurement up to 5 GigaΩ. g) Current Source: DC & AC, 10 nA (or less) to 100 mA (or more) or better, continuous (1 Hz to 200 kHz or better for ac). h) Sensitivity: 20 nV or better i) Resistance resolution: 20 nΩ at 0.1 A. j) Includes: sample wiring test station, sample mounting pucks.		
15.	**Magneto-thermal properties**	a) Temperature Range: 1.9 – 400 K. b) Vendor should provide data/publications for the supported temperature range. c) System must measure thermal conductivity, Seebeck coefficient, Thermopower–Figure of merit. d) Option should be there to simultaneously measure a sample's thermal conductivity, Seebeck coefficient, and electrical resistivity with a single sequence command. e) User should be able to measure the Nernst Ettingshausen effect with this option. Please provide supporting data /publication for reference. f) Two and Four probe measurement facility should be provided. g) Calibrated sample preferably Nickel should be provided. h) Thermal conductance:		

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		Accuracy: ± 5% or better. i) Seebeck coefficient: Accuracy: ± 5% or better. j) Seebeck coefficient measurement range: 1 μV/K to 1 V/K. k) Thermoelectric Figure of Merit: ± 15% or better. l) Tools: Small slotted Philips screw drivers and extractor tool. m) At least 5 SCI publications should be attached in support of the temperature range, accuracy and resolution of thermal measurement by the quoted instruments.		
16.	**Other Components**	a) Uninterrupted power supply (UPS): 40KVA with 30 mins battery backup must be supplied with the main instrument free of cost. b) Water Chiller Unit: Suitable water chiller unit must be supplied with the main instrument free of cost.		
17.	**Other accessories**	Spare fuses, O-rings, Hoses for chiller unit, Helium gas regulators.		
18.	**Future upgrade**	The system must be upgradable to add following measurement options: a) High Temperature VSM (Measurement up to 1000K) b) Broadband ferromagnetic resonance c) AC susceptibility measurement of samples down to 50 mK using Dilution Refrigerator		

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19.	**Other details**	**a)** A low vibration environment for the sample measurement must be provided. b) A dedicated window for monitoring cryostat status must be there. c) System should not use any inefficient mechanism of externally located helium reservoir and circulation mechanism and needle valve to control flow of gas, which results in very poor temperature control. d) The system should be equipped with sufficient number of thermometers at different stages / locations and on the cryocooler and the magnet to monitor their temperatures through the main operating software. e) Measurement pucks should be highly conducting copper for maintaining high thermal uniformity and also gold coated to prevent oxidation. f) Material samples can be measured either with, or without, measurement probes giving users more flexibility in research design and scope. g) Vendor must provide the detail specifications in the compliance statement with respect to each technical one in the tender document duly supported by the manufacturer's literature and published papers. Mere saying "Yes" in the compliance sheet without		

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		supporting data will not be accepted. h) Vendor must provide **at least 10 customer** satisfaction letter/ certificates from Indian Laboratories where similar measurement systems are installed and have been working satisfactorily. The document must not be older than 5 years. Mere installation reports will not be treated as a valid document for the said purpose. Those users will be contacted for feedback. i) Warranty: 1 year from the date of satisfactory installation. And cost of extended warranty for 3 more years thereafter should be indicated. j) The offer must be supported with the measurement data and published papers in support of all claimed specifications. k) Pre-installation site preparation requirements are to be included and specified along with the bid. l) Technical evaluation by the institute may include demonstration to verify the functionalities and the capabilities of the system quoted. Institute can also ask for the sample-measurement if required. m) List of similar items installed during last 5 years in Institutes like IIT/NISER/IISER/NITs in		

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		India with Contact Persons' names, addresses, phone numbers and e-mail ids must be provided. The vendor must have supplied and installed at least 20 similar equipments in the above institutes in last 5 years. n) Manpower: After its satisfactory installation, one Technical Person must be provided for one year free of cost for proper running of the instrument.		