

**ARYABHATTA RESEARCH INSTITUTE OF OBSERVATIONAL SCIENCES  
(ARIES)**

**(An autonomous Institute under DST, Govt. of India)**

**Manora Peak, Nainital, INDIA**

**Tel: +91 5942 235136; Fax: +91 5942 233439; Gram : astronomy  
website: <http://www.aries.res.in>**

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**Tender Inquiry No. : AO/2156/4-3-5/11-12/4kx4k CCD**

**Tender documents for the procurement of**

<b>Sl. No.</b>	<b>Brief description</b>	<b>Qty</b>
<b>1.</b>	<b>4kx4k back-illuminated, astronomical grade CCD camera along with the control electronics, preferably Liquid Nitrogen cooled</b>	<b>1 (One)</b>
<b>2.</b>	<b>Mechanical Shutter assembly with 100-mm square aperture</b>	<b>1 (One)</b>

**for the optical imager project, ARIES 3.6m Devsathal Optical Telescope India**

**Place at which delivery is required: ARIES, Manora Peak, Nainital, 263129, India**

**Issue of the tender document : 23<sup>rd</sup> November 2011 9:00 Hrs**

**Last date of submission of the tender document : 27<sup>rd</sup> December 2011 upto 14:00 Hrs**

**Opening of the technical Bid : 27<sup>th</sup> December at 15:30 Hrs**

**Opening of the financial Bid : Will be intimated after opening the technical bids**

## 1. Background

Aryabhata Research Institute of Observational Sciences (ARIES) is installing a 3.6 m optical telescope at Devasthal (latitude: 29° 23' North; longitude: 79° 41' East, altitude: 2450 m) in India. To achieve the scientific goals of the telescope, we plan to design and build an optical imager working in the wavelength range ~ 300nm to 1000nm and ready to be used as one of the first generation back-end instrument.

Tenders are invited from the vendors to supply a 4kX4k back-illuminated astronomical grade CCD camera and control electronics along with an appropriate shutter to be used to build the optical imager. The tender submission consists of the following steps.

- (i) The technical bid should include the detailed specifications of the CCD camera and other technical details as mentioned below in section 2 along with the time schedule for the delivery of the items. The technical bid should be sealed in a separate envelope.
- (ii) The commercial bid should contain total budget for complete assembly, which should be a firm upper limit. The commercial bid should be sealed in a separate envelope.

Both the sealed envelopes containing technical and commercial bid should be in one envelope and should be send to “**The Director, Aryabhata Research Institute of observational sciences (ARIES ), Manora Peak, Nainital – 263 129 India**”.

The CCD camera along with the cooling mechanism, control electronics and the shutter will be assembled along with the mechanical mounting flange and the electronic filter wheels assembly designed and developed at ARIES Nainital or the facilities available within the country.

## 2. Scope of the work for vendors:

This tender is to procure a scientific-grade 4kX4k back-illuminated single chip CCD camera along with the control electronics and an appropriate shutter assembly as per the specifications given below.

### (a) Specifications of the CCD Camera:

1. A scientific grade back-illuminated 4kx4k Charge Couple Device (CCD) chip equipped with the cooling mechanism and the control electronics, suitable for astronomical observations.
2. The Chip characteristics : Grade 0 or 1 chip with < 8 columns defects and < 20 traps. Also the number of hot pixels/white spots should be at minimum possible level as defined in case of scientific grade CCDs.
3. The CCD Chip format : Single chip, 4096 X4096 pixels
4. Architecture : Full Frame, window mode
5. CCD Pixel size : Square; 15-micron, Epi thickness ~ 30 micron
6. Full well capacity per pixel : > 200 kilo electrons
7. Dark current : < 10<sup>-6</sup> electrons/pixel/sec
8. Linearity : < 1 %
9. Read out noise, rms values : 2.5-3.5 electrons at 100 kHz to 5-7 electrons at 1 MHz, s/w selectable read out speeds of 100kHz, 500kHz and 1 MHz, multi-port read out options with nearly zero cross-talk

- 10. A-D conversion : 16 bit, variable gain values (1,2,3 and 5 electrons/ADU)
- 11. Modes of binning : On-chip 2x2, 3x3 and 4x4 binning modes, s/w selectable
- 12. Clocked Anti-blooming facility and optional MPP mode operation, s/w selectable
- 13. Quantum efficiencies : spectral range 300 nm to 1000 nm, Enhanced blue sensitivity (optimized with help of anti-reflection coating on the chip and the quartz plate etc.), Peak Quantum efficiency greater than ~ 95 % at 450 nm, ~ 75 % at 350nm, ~90% at 550nm, ~ 85% at 650nm, ~ 80% at 750nm, ~ 60% at 850nm and ~ 30% at 950nm.
- 14. Non-coplanarity tolerances : < 100 micron between the CCD chip and the mounting flange
- 15. Effects like multiple reflection, ghost imaging should be minimized using appropriate AR coating on the optical surfaces.
- 16. Power dissipation of the control electronics < 60 W (working at 230V and 50Hz)
- 17. Operating temperature range of the camera : -10C to 30C.
- 18. The application software (compatible both for Linux and Windows and user configurable) to control the camera and to acquire the image should be supplied, supporting the FITS Image format as per the given specifications.
- 19. Preferably Fiber optics interface of ~ 100 meters between the camera controller and the workstation.
- 20. Cooling mechanisms : A suitable cooling mechanism capable to cool the CCD chip to temperatures as low as < -100C. In case of Liquid Nitrogen cooling, the Dewar should have a cooling hold time of nearly 12 hours with inbuilt temperature and pressure gauges.

**(b) Specifications of the mechanical shutter:**

- 1. Shutter : A mechanical shutter assembly with a minimum shutter opening time of the order of a few tens of millisecond with a uniform illumination on the chip and a minimum square aperture of ~ 100mm. The required exposure times should be in the range of 0 sec to 3600 sec.

**Note:**

Tenderer on their own interest can quote for similar systems with deviations (e.g. values of CCD parameters like Read out noise, full well capacity and required cooling mechanisms other than liquid Nitrogen Dewar) from the above mentioned specifications.

## **1. Instructions to tenders**

**1.1** The tenderers can submit the tender document by paper- mail (To, Director, ARIES, Nainital 263129 India) in a sealed envelope in two parts (i.e. Technical and Price bids). The technical & price bids are to be kept separately in different envelopes and these envelopes will be superscribed with "Technical Bid" or "Price Bid", Tender No., Description, Due Date and Sender's Name etc. These two envelopes will again be kept together in one single envelope. This envelope will be superscribed with Tender No., Item, Due Date, Sender's Name & Address etc. Technical Bid shall be completely identical in all respect with Price Bid except the price. Price Bid will indicate price where as technical bid will leave the price column blank. The envelope of technical bid will contain EMD of INR 200000.0 in form of a Demand Draft/Bank Guarantee in favor of "Director ARIES" payable at Nainital. Further, any technical literature/reference etc should also be enclosed in the technical bid. The financial bid should be the list of the items/accessory. The prices for the accessories should be mentioned on per unit basis.

**1.2** Only Original Equipment manufactures or their authorized distributors can apply. A valid certificate should be enclosed with the proposal if the proposal is made by a distributor.

**1.3** A Proforma Invoice may also be given which should contain the following information:

**(a)** The FOB value, the CIF value for import by Sea-freight/Air freight and for air parcel post up to Delhi should be separately indicated.

**(b)** The earliest delivery period and country of origin of the item/accessories.

**(c)** Banker's name and address of the tenderer.

**(d)** The approximate net and gross weight and dimensions of the packages/cases.

**(e)** Details of any technical service, if required for erection, assembly, commissioning and demonstration.

**1.4** The FOB & CIF prices quoted should be inclusive of all taxes,levies,duties arising in the tender's country.

**1.5** The Indian agent commission, if any should be indicated in Indian Rupees in case of opening of the tender.

**1.6** The offer should be valid for a minimum period of 120 days from the due date of the opening of the tender.

**1.7** The quotation should be valid for 120 days from the closing date of the tender i.e. due date of receipt of tenders. Late tenders will not be considered.

**1.8** Offers made by Indian Agent on behalf of their principals, should be supported by the Proforma Invoice of their principals.

**1.9** The authority of person signing the tender, if called for, shall be produced.

**1.10** All documents/correspondence should be in English language only.

**1.11** Director, ARIES reserves the right to accept or reject the lowest or any other offer in whole or in part without assigning any reason.

**1.12** It is expressly agreed that the acceptance of the items/accessories contracted for is subject to final approval in written by the Director ARIES or a person nominated by him.

**1.13** Partial shipment is prohibited.

**1.14** Where erection or assembly or commissioning is a part of the contract, it should be done immediately on notification. The contractor shall be responsible for any loss/damages sustained due to delay in fulfilling this responsibility.

**1.15** Tenders send by postal mail/speed post/courier services will only be received.

## **2. Terms & Conditions**

### **2.1 Prices:**

Tenders offering firm prices will be preferred. Such offers should invariably be supported by the base price taken into account at the time of tendering and also the formula for any such variations.

### **2.2 Terms of payment:**

The normal terms of payment are by banks letter of credit (LC) normally only 90% of the payment will be made through LC. The rest 10% will be payed through the bank draft/wire transfer after the camera is demonstrated at ARIES, Nainital to be working according to the specifications furnished by the tenderer. The amount of 10%, mentioned above, will be released after receipt of PBG of 15% of the total cost as given in clause number 2.4.

**2.3** The letter of credit will be operative on presentation of the under mentioned documents.

**(a)** Original bill of the lading/airway bill.

**(b)** Invoices describing the terms/accessories delivered, quantity, unit rate and their total value in triplicate. The invoice should indicate the discounts, if any, and Agency commission separately.

**(c)** Packing list showing individual dimensions and weight of packages.

**(d)** Test certificates.

**(f)** Declaration by the seller/company that the contents in each case are not less than those entered in the invoice & the quality of the items/accessories are guaranteed as per the specifications furnished in the product's brochures and specifications submitted with the tender.

**(g)** Warranty & guarantee certificates

**2.4 Warranty agreement:**

The vendor has to provide performance bank guarantee equal to an amount of 15% of the total cost of the contract for a period of 14 months. Warranty shall be 12 months after the goods have been taken over by ARIES against any defective design, workmanship, materials and non conformance to intended performance.

**2.5 Export License:**

Foreign Vendors making proposals should ensure availability of export licence as per their Govt. regulations for export to India. Vendor shall be required to obtain and maintain all Export/Import licences and permits etc., as the case may be, required for performing supplies against this tender. Obtaining export licence shall be entire responsibility of the vendor.

**2.6 Demurrage:**

Supplier shall bear demurrage charges if any incurred by the ARIES due to delayed presentation of shipping documents as prescribed in Para 2.3 to the Bankers within reasonable time (within 15days) from the date of the bill of lading for sea consignments or date of Air Way Bill for Air consignments.

**2.7 Guaranteed Time of Delivery:**

The time for and the date of delivery stipulated in the Purchase Order shall be deemed to be the essence of the Contract, Delivery must be completed within the dates specified therein.

**2.8** If any technical query or clarification is asked by ARIES about the performance of the equipment, it has to be positively answered by the tenderer within a stipulated time.

**2.9** Director, ARIES may upon written notice to the Contractor terminate the Contract in whole or in part in circumstances detailed here under.

**(a)** If in the judgment of the ARIES, the Contractor fails to made delivery within the time specified in the Contract Agreement or within the period for which extension has been granted by the purchaser to the contractor.

**(b)** if in the judgment of the ARIES, the contractor fails to comply with any of the other provisions of this contract.

**2.10 Packing:**

The Vendor shall be responsible for the stores being sufficiently and properly packed for tropical storage and for transport by rail, road, sea or air so as to ensure arrival at ARIES's site without any loss or damage. The packings and marking of packages shall be done by and at the expense of the Vendor. Each package shall contain packing note quoting purchase order number and date showing its contents in detail. Each shall be properly marked with Purchase Order No., Consignee's name & address, package handling instructions etc. The package shall have adequate provision for handling during transit.

**2.11 Receipt & Dispatch:**

The Vendor is responsible for obtaining a clear & clean receipt from the transport authorities specifying the goods dispatched with proper & sound packing. He will not book any consignment on a 'said to contain' basis. If he does so, he does it on his own responsibility. ARIES will take no responsibility for short deliveries or wrong supply of goods when the same are booked on 'said to contain' basis. ARIES shall pay for only such stores as are actually received by them.

**2.12 Extension of Time:**

If the completion of supply is delayed due to reason of Force Majeure such as acts of God, acts of public enemy, acts of Government, fires, floods, epidemic, quarantine, restrictions, strikes and freight embargoes, the contractor shall give notice within 15 days to the purchaser in writing of his claim for an extension of time. The purchaser on receipt of such notice after verification, if necessary may agree to extend the contract delivery date as may be reasonable but without prejudice to other terms and conditions of the contract.

**2.13 Rejection:**

In the event that any of the items or accessory supplied by the contractor is found defective in material or workmanship otherwise not in conformity with the requirements of the contract specifications, ARIES shall either reject the items/accessory or request the contractor, in writing to defective items or accessories free of cost to the purchaser. If the contractor fails to do so, Director ARIES may at his/her option hold the remaining payment to the contractor.

**2.14 Indemnity:**

The contractor shall warrant and be deemed to have warranted that all items supplied against this contract are free and clean of infringements of any Patent copy right or trademark and shall at all times indemnify the Purchaser against all claims which may be made in respect of the items for infringement of any right protected by Patent registration of design and Trade Mark and shall take all risks of accidents or damage which may cause a failure of the supply from whatever cause arising and the entire responsibility for the sufficiency of all the means used by him for the fulfillment of the contract.

**2.15 Applicable Law:**

This contract shall be governed by and subject to and interpreted and construed in accordance with the Laws of Republic of India, as may be in force from time to time.

**2.16** The tender should sign all the printed pages of the tender form/documents in order the contract to be effective.

**2.17** If any of the terms or conditions specified in this document is not acceptable by the tenderer, it should be explicitly stated while submitting the tender document.

**2.18 Jurisdiction:**

Any legal matter whatsoever arising out of this contract will be decided within the jurisdiction of ICADR plot no. 6, Basant Kunj, Industrial are, Phase-II, New Delhi-110070.

**2.19 Arbitration:**

All disputes or differences whatsoever arising between the parties out of or relating to the construction meaning and operating or effect of this contract or the breach thereof which cannot be resolved through mutual consultation shall be settled by arbitration in accordance with the rules of arbitration of the Indian Council of Arbitration and the award made in pursuance thereof shall be binding on the parties.