

Ref No : PUR/IMP/CCD/HESP/SRT/2012-13.

April 19, 2012.

M/s.

Dear Sir/s,

The Director, Indian Institute of Astrophysics, Bangalore, invites Sealed Tenders ((a) technical bid along with commercial bid without price, (b) price bid) for the Import of **“CCD Camera System Consisting of 4K X 4K - E2V CCD231-84 Standard Silicon with Custom AR Coating, Chip, Controller and Dewar - 1 unit as per the attached Technical Specifications and Annexure I, II & III.** The terms and conditions may be noted from IIA Website and if you are in a position to quote for the supply in accordance with the requirements, please submit your quotation. The Tender documents and other details are available on IIA web site www.iiap.res.in/tenders.htm

Eligibility Criteria of Vendor: The vendor must have understanding, experience and infrastructure for the design and fabrication of CCD Systems and associated software. A profile of the company and its past experience in the design and development of astronomical Detector systems should be enclosed with the Technical bid.

The Tender bids must be in foreign currency only. Your completed Tender bids ((a) technical bid along with commercial bid without price, (b) price bid) must reach our office on or before 21/05/2012 by 15 00 hrs. The bids must be in a separate Sealed envelopes duly superscribed with the name of the supply and the Due Date and all the envelopes kept in a bid envelopes mentioning “Quotation for CCD Camera System Consisting of CCD Chip, Controller and Dewar”. must reach this Office within the Due Date and time. The Technical bids (a) will be opened in the presence of the bidders or their authorized representative of the Company by 15.30 hrs on 21/05/2012. The Commercial bids (b) will be opened only those vendors quotes qualify in Technical Evaluation. The opening of commercial bids date will be intimated later. Incomplete Bids are liable for rejection.

For any Technical clarification you may contact during Office hours Dr.Sunetra Giridhar (Phone No.22541322) or Dr.Sivarani Thirupathi (Phone No.22541357) and for any commercial clarifications can contact Shri Y.K.Raja Iyengar, Purchase Officer (Phone No.22541244).

Thanking you,

Yours faithfully,

Y.K.Raja Iyengar
Purchase Officer

**GLOBAL TENDER DOCUMENT No : PUR/IMP/CCD/HESP/SRT/12/2012-2013.
DT : 19/04/2012.**

TENDER FORM

FROM:

TO

THE DIRECTOR
Indian Institute of Astrophysics,
Bangalore - 560 034.

Sir,

I/We hereby offer to supply the Items/Equipment indicated below at the price hereunder quoted and agree to hold this office open till . I/We shall be bound to supply the items/Equipment hereby offered upon the issue of the Purchase Order communicating to the acceptance thereof on or before the expiry of the last mentioned date. You are at liberty to accept any one or more of the items such Items/Equipment. I/We not withstanding that the offer in this tender has not been accepted in whole, shall be bound to supply such items and such portion or portions of one or more of the items as may be specified in the said Purchase order communicating the acceptance.

S No.	Description of the item(s)	Qty.	Unit
1.	CCD Camera System consisting of 4K X 4K CCD E2V CCD231-84 Standard Silicon with Custom AR Coating, Chip, Controller & Dewar as per the attached Technical Specifications and Annexure I, II & III. (Tender bids should be in Foreign currency only)	-	1 unit

Place at which the Delivery is required : Indian Institute of Astrophysics
Bangalore - 560 034.

Date by which the supplies are required : 4 weeks from the date of order.

2 I/We have understood the items of the tender annexed to the invitation to the Tender and have thoroughly examined the specifications/drawing and / or pattern quoted or referred to herein and / are fully aware of the nature of the items/ Equipment required and my / our offer is to supply the items/ Equipment strictly in accordance with the requirements subject to the terms and conditions contained in the Purchase order communicating the acceptance of this tender either in whole or in part.

Date :

Signature and Seal of Supplier

Annexure - A

INSTRUCTIONS TO SUPPLIERS

1. Tenders should be sent in a sealed and superscribed envelopes with mention of Tender No. date and date of opening. Only one Tender should be sent in each envelope.
2. Late and Delayed tender will not considered at all.
3. Duties, Taxes where legally leviable and intended to be claimed should distinctly shown separately in the Tender.
4. a) Your quotation should be valid for 90-120 days from the date of opening of Tender.
b) Prices are required to be quoted according to the units indicated in the annexed tender form. When quotations are given in terms of units other than those specified in the Tender form, relationship between the two sets of units must be furnished.
5. a) All available Technical Literature(s), Catalogue(s) and other data in support of the specifications and details of the item(s) should be furnished along with the offer.
b) Approximate net and gross weight of the items offered shall be indicated in your offer. If dimensional details are available the same should indicated in your offer.
c) Air freight/sea freight charges up to Bangalore Airport may be sent along with the offer.

d) Specifications:

Items / Equipment offered should strictly conform to our specifications. Deviation, if any should be clearly indicated by the Supplier in their quotation. The supplier should also indicate the Make / type No. of the stores offered and provide catalogue(s), Technical literature(s) and sample(s), wherever necessary along with the quotations. Test certificates wherever necessary should be forwarded along with the supplies. Whenever options are called for in our specifications, the Supplier should address all such options. Wherever specifically mentioned by us, the Supplier could suggest changes to specifications with appropriate response for the same.

1. Corrections, if any, must be attested. All amounts shall be indicated both in words as well as in figures. Where there is difference between amounts quoted in words and figures, amount quoted in words shall prevail.
2. The supplier should supply along with the tender, the Banking information for payment or any other purpose.
3. A complete set of instruction and operation manual should be supplied.
4. Final performance should be guaranteed.

TERMS AND CONDITONS OF CONTRACT

1. DEFINITIONS:

- a) The terms 'Purchaser' shall mean the Director, Indian Institute of Astrophysics, Bangalore - 560 034.
- b) The term 'Supplier' shall mean, the person, firm or company with whom or with which the order for the supply of Items / Equipment is placed.
- c) The terms 'Purchase Order' shall mean the communication signed on behalf of the Purchaser by an officer duly authorized intimating the acceptance on behalf the Purchaser on the terms and conditions mentioned or referred to in the said communications accepting the tender or offer of the supplier for supply of Items/Equipment.

2. PRICES:

The price may please be indicated on unit basis only.

Duty Exemption:

Please note that we may issue "Customs duty Exemption Certificate", if acceptable under the Govt. of India notification No.51/96 valid till 2016.

3. GUARANTEE AND REPLACEMENT:

The Supplier shall guarantee that the Items/Equipment supplied shall comply fully with the specifications laid down, for material workmanship and performance. The Guarantee should be for a period of one year minimum from the date of supply.

4. PACKING, FORWARDING AND INSURANCE:

The Contractor will be held responsible for the stores being sufficiently and properly packed for transport by air / Sea to withstand transit hazards ensure safe arrival at the destination. The packing and marking of packing shall be done by and at the expenses of the contractor. The Purchaser will not pay separately for transit insurance, all risks in transit being exclusively of the supplier and the Purchase shall pay only for such Items/Equipment as are actually received in good condition, in accordance with contract.

5. **TEST CERTIFICATE:**

Wherever required Test Certificate should be sent before dispatch of the items.

6. **ACCEPTANCE OF ITEMS / EQUIPMENT:**

a)It is expressly agreed that the acceptance of Items/Equipment, is subject to final approval by the Purchase, whose decision shall be final.

7. **DELIVERY PERIOD:**

Delivery is the essence of the contract. The supplier should adhere to delivery schedule as indicated in the Purchase order.

8. **EXTENSION OF DELIVERY TIME:**

As soon as it is apparent that Supplier dates cannot be adhered to, an application shall be sent by the Supplier to the Purchaser. If failure, on the part of the Supplier to deliver the Items/Equipment in proper time shall have arisen from any cause which the Purchaser may admit as reasonable ground for an extension of the time (and his decision shall be final he may allow such additional time as he considers it to be justified by the circumstances of the case). In case of Letter of Credit the banking charge for the LOC amendment will be on suppliers account.

9. **PAYMENT:**

Preference will be given to the supplier whose payment terms is on Site Draft.

10. **SECURITY FOR PAYMENT:**

Successful Supplier will have to furnish in the form of a Bank Guarantee or any other form as called for by the Purchase towards any payments before supply of items/equipment. In case of payment through Letter of Credit the Banking charges outside India and inside India will be on suppliers account.

11. Late / delayed offer will not be considered.

12. IIA is not responsible for any delay / loss of documents in transit.

13. IIA reserves the right to reject any or all tenders without assigning any reasons.

Technical Specifications :

1.Detector

- 4K x 4K CCD E2V CCD231-84 standard silicon chip, with custom AR coating, pixel size: 15 micron square pixel
- Back Illuminated
- Scientific grade
- Custom coating - *graded AR (anti-reflective) coating, optimized for a fixed wavelength format in 2D covering 350nm-1000nm (See Annexure-II for details)*
- Four Outputs
- Package Format Silicon carbide with two flexi connectors
- Height tolerance $\pm 10 \mu\text{m}$
- Connectors Two 37-way micro-D
- Amplifier sensitivity $7 \mu\text{V/e}^-$
- Readout noise 5 e^- at 1 MHz
 2 e^- at 50 kHz
- Maximum pixel data rate 3 MHz
- Charge storage (pixel full well) 350,000 e^-
- Dark current: $\sim 3 \text{ e}^-/\text{pixel}/\text{hour}$ (at $-100 \text{ }^\circ\text{C}$)
- Flatness $< 20 \mu\text{m}$ (peak to valley)

Quantum efficiency

- Peak Quantum efficiency: $> 90\%$
- Projected Quantum efficiency in the blue at red wavelengths:

<u>Wavelength(nm)</u>	<u>QE(%)</u>
350	> 40
400-800	> 90
900-1000	> 40

Fringing in red 600-1000nm should be $< 1\%$ of the mean level

2.CCD Dewar

- Cryostat: LN2 cooling with Automatic refilling using
 - (a) liquid level monitoring or (b) continuous flow
- Manual model of filling in addition to either of the above two options.
- Capacity: 2.4 liters (Manual filling mode)
- Off-centered LN2 filling port (for manual filling mode, in order to maximize the LN2 holding capacity for a horizontally mounted dewar)
- Holding time > 24 hrs (for manual filling)
- Operating temperature: -100deg C to -120deg C
- Entrance window: please refer to the attachment.
- Seal OFF Valve Operator Port' : KF25 Bulk Head
- Shutter : Thin electromechanical mounted externally
- Mounting Orientation: Custom mount (please see Annexure-II)
- CCD window: Custom (Please Annexure-II for details)
- CCD window needs to be fitted with a field flattener (fused silica), which has a cylindrical surface facing the detector chip, with a custom mounting.

3. CCD controller

- Lakeshore like temperature controller
- Astrocam Generation-3 CCD controller with
 - PCI host interface card
 - 6-slot chassis with power control board
- 1- timing board
- 1-clock board
- 1-fan out board
- CCD video processor for Four channels
- Duplex fiber optic link between host computer and controller
- Cable length 3meter – one number
- Cable length 15meter – one number
- Controller software C, C++, python under linux
- PC host computer with Linux operating system
- Data Acquisition software under Linux operating system
- Selectable readout speeds 200KHz, 400KHz,600KHz,1MHz
- Selectable system gain (atleast 2 settings)
- User selectable binning and windowing
- FITS format data output
- Graphical user interface
- Macro operation for high resolution spectroscopy and radial velocity application
- DS9 display tool
- Remote control with a network connection to the host computer

- Real time data handling
- Extendable post-processing
- Multi window viewing
- CCD header: see annexure-III

Environmental conditions:

operating 0 to +25°C, RH 10-50%
storage -30 to +35 °C , RH 0-95 %

4. CCD system tests:

The following tests need to be performed at representative wavelengths covering the range 350-1000nm

- 1.Pixel response non-uniformity
2. Cosmetics
3. PSF degradation
4. Readout noise, gain linearity and full well capacity, charge transfer efficiency
- 5.Quantum efficiency, stability of the detector sensitivity over the temperature range.

The results need be compared with E2V test results and data sheets. PSF degradation due to lateral charge motion should be less than 0.6 pixel at 350-400nm and much less for the redder wavelength, for the normal operating collection voltage.

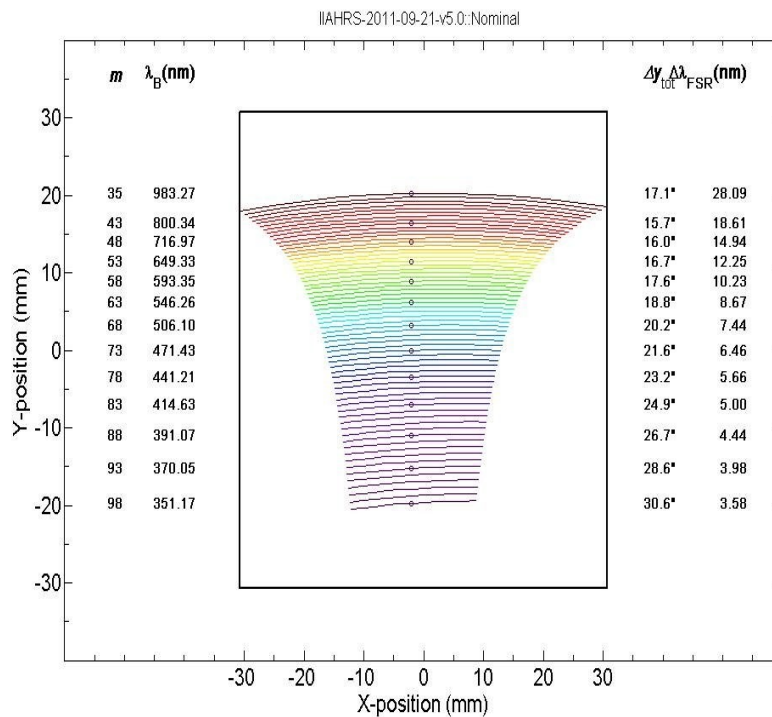
5. Technical Collaboration: The CCD dewar dimensions and wavelength format and orientation of the detector are approximate values, hence the vendor needs to work in close collaboration with IIA in designing the entire CCD system. The alignment, tilt and rotational tolerances of the window, CCD chip are crucial for the good performance of the spectrograph.

Annexure-I

Graded AR coating on the CCD Chip:

The graded AR coating should be optimized for fixed wavelength format of the Echelle spectrograph, (similar to what is supplied by E2V for HERMES spectrograph on Mercator telescope) Please see the figure below for the wavelength format on the detector. The wavelength range (350-1000nm) and the wavelength format including the curvature of the echelle needs to be considered for the optimization.

Exact wavelength format on the CCD chip will be provided to the chosen vendors.



Annexure-II

CCD window

The CCD window needs to be replaced by field flattener of the spectrograph camera.

Field flattner has a cylindrical concave surface (R843mm) facing the detector. and the spherical surface in the front (R1042mm)

The field flattner description:

Front surface: Spherical surface in the front end and

Back surface (facing the CCD chip): cylindrical.

Diameter of the field flattner :100mm.

Field mask diameter:78mm

Thickness of the field flattner: 10.4mm.

Distance from the cylindrical end to the CCD chip surface:12mm.

Spherical surface to the field mask distance :6.4mm.

Detailed drawings and the exact numbers and tolerances will be provided to the chosen vendors.

Annexure-III

List of CCD headers:

Fits format: Current standards of fits

Fits keywords:

Date of observations, object name, observatory name,

Telescope name, Telescope focus, Observer's name,

RA, DEC, UT, ST, ZD, pixel scale, Epoch, Airmass, Exposure time, NPIXSAT,

detector's name, detector's size, detector's temperature,

Amplifier name, gain setting, read noise, dark current, semester (proposal time), CCDSEC, DETSEC, TRIMSEC, image-typ, CCD speed, etc

-Telescope header: Dome humidity, Dome temperature, program title, wind speed, wind direction.

-Instrument header: sliced/unsliced, Echelle angle, cross-disperser angle,

focus, Resolution, Double fiber/ single fiber, comparison ON/OFF, seeing,

MJD, Temperature, Pressure, slit width, lamp 1/lamp2/lamp 3/lamp 4

(ON/OFF), object type : Object, calibration, sky, object-sky, object-calibration,

Flats: +slit mirror, -slit mirror (focused /defocused), slit mirror position,

Guide time, Guide FWHM, estimated Sig2noise ratio, central wavelength, wavelength range.