



**INDIAN INSTITUTE OF ASTROPHYSICS**

**2nd BLOCK, KORAMANGALA,**

**BENGALURU - 560034**

**Phone 080-25530672**

**Fax 080-25534043**

**Email purchase@iiap.res.in**

**Website : www.iiap.res.in**

**GLOBAL TENDER NOTICE NO: RFT/IMP/044/16-17**

The Director, Indian Institute of Astrophysics invites Quotations/Bids (**Double Bid System**)

both Technical and Commercial bid from reputed firms for the following.

<b>S.No.</b>	<b>Description in Brief</b>	<b>Quantity</b>
1	VELC_modulator - Polarization modulator for Visible Emission Line Coronagraph (VELC) as per the RFP - Technical Specifications Attached.	1

Note:

1. The Tender documents with specification details are available on IIA website [www.iiap.res.in/tenders.htm](http://www.iiap.res.in/tenders.htm). Hence the interested tenderers may at their option download the same from our website(as no hard copies of Tender documents is/are provided from this office) and submit their offer both Technical and Commercial bids. However, your offer with Technical and Commercial bid should be submitted in a sealed envelope superscribed mentioning the tender notice no., Date of opening and addressed to "The Director, Indian Institute of Astrophysics, Bangalore-560 034."
2. The firms who fulfill the following requirements shall be eligible to submit their Bids. Joint ventures are not acceptable.
  - (a) Tendering Company shall be professionally managed and equipped with facility for the supply and maintenance of tendered items.
  - (b) The Tenderers should have completed, the last 3 financial years(i.e., current year and two previous financial years) at least one similar single work for a minimum value of Rs. 2,00,00,000.00.
- 3.The Bid supported by the above information should be submitted in sealed envelopes duly superscribed with the name of work / Item. The completed Techno Commercial bid will be received by this office upto 03:00 p.m on or before 20/02/2017 .
4. If any information furnished by the tenders is found incorrect at a later stage, the firm shall be liable to be debarred from tendering and taking up of work in IIA. The Institute reserves the right to verify the particulars furnished by the tenderers.
5. The interested tenders may contact during office hours Prof. B.Raghavendra Prasad (Ph.No. 080 2254 1294) to discuss Technical clarification and Mr. K.P.Vishnu Vardhan (Ph.No. 080 2254 1244) for Commercial clarification, if any, on or before 17/02/2017 before submitting the bids.
6. The firms should submit the bids superscribed upto 03:00 p.m. Latest by 20/02/2017. The Techno Commercial bids will be opened in presence of the bidders or their authorized representatives at 3:30 p.m on 20/02/2017.
7. Incomplete bids are liable for rejection.
8. Late / delayed offer will not be considered.
9. IIA is not responsible for any delay/loss of documents in transit.
- 10.The offer should be valid for a minimum period of 120 days from the date of opening of bid.
11. IIA reserves the right to reject any or all tenders without assigning any reasons.

Stores & Purchase Officer  
For & on behalf of Director



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No.GT/RFT/IMP/044/16-17

Dated : 10<sup>th</sup>January 2017

M/s.

Dear Sir,

The Director, Indian Institute of Astrophysics, Bangalore invites Sealed Tenders (Two Bid System) for the supply of stores detailed in the Tender form hereto attached. The Tender Terms and conditions attached are also may be noted carefully. If you are in a position to quote for the supply in accordance with the requirement, please submit your quotation in the attached Tender Form also.

Your Technical and Commercial bid must reach this office on or before the date and time indicated in the Tender Schedule.

Thanking You,

Encl: as above

Yours faithfully,

Stores & Purchase Officer  
For & on behalf of Director



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**GLOBAL TENDER DOCUMENT NO: RFT/IMP/044/16-17**

**Tender Form**

**From**

**To**

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

I/We hereby offer to supply the stores indicated below at the price hereunder quoted below and agree to hold this offer open till\_\_\_\_\_. I/We shall be bound to supply the store 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 anyone or more of the items of such stores. I/We notwithstanding 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.

<b>S.No.</b>	<b>Description of the item(s)</b>	<b>Quantity</b>	<b>Unit</b>	<b>Rate (Rs)</b>
1	VELC_modulator - Polarization modulator for Visible Emission Line Coronagraph (VELC) as per the RFP - Technical Specifications Attached.	1	NUMBERS	0.00

Place at which the delivery is required : The Director, IIA, 2nd Block, Koramangala, Bangalore - 560 034.

Date by which the supplies are required : Within 5 Months from the date of receipt of Purchase Order.

2. I/We have understood the items of the tender annexed to the invitation to this Global 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 stores required and my/our offer is to supply the stores strictly in accordance with the requirements subject to the terms and conditions contained in the Purchase order, if communicated on the acceptance of this tender either in whole or in part.

Date :

Signature and seal of Tenderer

## ANNEXURE-A

### INSTRUCTIONS TO SUPPLIERS

1. Tenders should be sent in a sealed and super-scribed envelopes with the 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 be considered at all.
3. Duties, Taxes where legally leviable and intended to be claimed should distinctly shown separately shown 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 be indicated in your offer.  
c) Air freight/sea freight charges upto Bangalore Airport may be sent along with the offer.  
d) Specifications:

Items/Equipment offered should 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 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 CONDITIONS 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 2021.

### 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. PACKAGING, FORWARDING AND INSURANCE :

The Supplier will be held responsible for the stores being sufficiently and properly packed for transport by rail, road, sea or air, to withstand transit hazards and ensure safe arrival at the destination. The packing and marking on the 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 contractor and the Purchaser shall pay only for such stores as are actually received in good condition, in accordance with contract.

### 5. TEST CERTIFICATE :

Wherever required Test Certificate should be sent along with the relevant dispatch documents.

### 6. ACCEPTANCE OF ITEMS/EQUIPMENTS :

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

### 7. DELIVERY PERIOD:

Delivery is the essence of the contract. The supplier should adhered 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 Sight 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. In the case the payment terms are on Milestone/Progressive Payment, 5% / 10% of each milestone payment will be deducted as a Retention/Holdback Amount and will be paid after final satisfactory acceptance / Tests of the required items / Equipment.

12. IIA reserves the right to reject any or all the Tenders without assigning any reason.

Stores & Purchase Officer  
For & on behalf of Director

# REQUEST FOR PROPOSALS FOR SUPPLY OF POLARIZATION MODULATOR

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## **Name of the proposal:**

Polarization modulator for Visible Emission Line Coronagraph (VELC).

## **Polarization modulator**

### **I. Physical dimensions and quantity of polarization modulator:**

Dimensional specifications and quantity of the polarization modulator are mentioned in the Table1.

**Table 1: Polarization modulator and quantity:**

S.No	Name	Size (mm)	Thickness (mm)	Quantity
1	Polarization modulator	32	~5mm	4

### **II. Technical specifications of Polarization modulator**

This section gives the technical specifications of polarization modulator in detail.

**Table 2: Specifications of polarization modulator**

Specifications of Polarization modulator			
S.No	Parameter	Value	Tolerance
1	Physical size	32 mm ( Including housing)	+0/-0.1mm
2	Aperture shape	Circular	
3	Clear aperture	>25mm	
4	Thickness	4mm to 5mm	
5	Material	Space qualified materials (See Additional details section)	
6	AR coating	Ravg <1% over 500nm to 1100nm	
7	Transmission	>92% over 500nm to 1100nm	
8	Retardance	90°	±0.5°
9	Retardance knowledge	±0.1°	
10	Central wavelength of retardance	1074.7nm (air)	±0.1nm
11	Acceptance cone angle	4° ±0.1° ( Over this angle of incidence the retardance should not vary more than 0.1 deg)	
12	Beam deviation	≤30" after mounting	
13	Transmission wavefront error (PTV)	<λ/4, (λ: 632.8nm)	Transmitted



			wavefront error, single pass peak to valley over entire aperture
14	Damage threshold	2 J/cm <sup>2</sup>	
15	Cosmetic quality	40/20 as per MIL-C-13830	
16	Mechanical housing	Black anodized Ti6Al4V as an enclosure ring. Venting to be provided if required. The mounting/ glue material used should be space qualified.	
17	Operating temperature	22°C± 5°C ( Operational)	
18	Storage Temperature	-10°C to +40°C (Non-Operational)	
19	Space Heritage	Provide space heritage of the component and/ or vendor	Details of the space polarimetry optics development by the vendor to be provided

**Additional details:**

1. Materials used in the polarization modulator should be space qualified and conform to MIL-G-174 Grade A.
2. Exact thickness and effective index of refraction of the modulator should be provided for estimation of focal plane shifts.
3. Retardance of the modulator should not change by more than 0.1° over the angle of incidence of 4°.
4. Appropriate bevels should be provided on all edges.
5. Venting ports should be provided on the housing if air spaced type modulator.
6. In case of glue is used for mounting, It should be qualified for usage in space with CVCML and RML values < 0.01%, < 1% respectively.
7. Vendor should briefly describe the methodology of measuring polarization performance parameters like retardance, retardance knowledge, central wavelength, temperature and FOV effects at the time of bidding.

### **Eligibility criteria of vendor:**

Vendor must have the knowledge, infrastructure and heritage in manufacturing of polarization modulator with similar specifications for space applications. Preference would be given to those vendors who have already supplied polarization optics for solar missions. Details of the projects and end user shall be provided in case of heritage. If any published articles or technical documents can be shared with us.

### **III. Environmental specifications for polarization modulator (Optional)**

Following environmental tests should be carried out on the witness or actual samples. For the anti reflection coating, the witness and the actual modulator has to be coated in the same batch. Parameters to be measured on the witness sample before and after environmental tests are discussed in this section. **(Vendor may give cost indications for the following tests).**

#### **1. Coating durability & cosmetics specifications:**

Witness sample or actual modulator should undergo the adhesion and abrasion tests as per MIL-C-675A. Cosmetic quality of the witness samples shall be provided as per MIL-PRF-13830B in photographs before and after adhesion and abrasion tests.

### **Environmental Tests:**

#### **1) Thermo vacuum test:**

Witness samples should undergo a thermo vacuum test, as per below specifications

No. of cycles	:	5
Temperature range (deg C)	:	9 to 35 deg C.
Duration at each temperature	:	2 hours.
Rate of temperature change	:	~2 deg C/minute
Vacuum level	:	1 x 10 <sup>-5</sup> mbar or better.

#### **2) Humidity Exposure (as per MIL-C-675A)**

Relative humidity	:	95%
Temperature	:	50 <sup>0</sup> C ± 2 <sup>0</sup> C
Exposure duration	:	24 hrs

### 3) Acceptance test plan matrix:

1 <sup>st</sup> sample	:	Adhesion & Humidity
2 <sup>nd</sup> sample	:	Abrasion & Thermo-Vac
3 <sup>rd</sup> &4 <sup>th</sup> sample	:	Control sample

Properties like retardance, transmission profile, wavefront error, cosmetic quality etc of the witness samples should be measured before and after environmental tests and should meet the specifications mentioned in Table 2. All witness samples should meet the corresponding cosmetic quality specifications as per MIL-PRF-13830B in Table 2 before and after environmental tests.

### 4. Tests on polarization modulator :

Following environmental tests should be carried out on the polarization modulators.

(a) Thermovac cycling with a temp. range of -15 to 40degC containing 5-cycles with 2-hour duration in each temperature. Vacuum level is to be better than  $1 \times 10^{-5}$  mbar or better.

(b) Humidity exposure as per MIL-C-675A

(c) Vibration test: The polarization modulator to be tested for vibration load of 35G. The visual inspection of the polarization modulator (after vibration) should conform to the cosmetic quality as specified in MIL-C-13830

Polarization performance (retardance value), surface figures, and cosmetic qualities to be measured before and after each environment test. Modulator should meet the corresponding cosmetic quality specifications as per MIL-PRF-13830B in Table 2 before and after environmental tests.

### **Deliverables**

1. Polarization modulator listed in Table1, meeting the specifications in Tables 2.
2. Conformance certificates for the specifications in Tables 2.
3. Certificates of substrate glass material should be provided.
4. Inspection certificate as per MIL-PRF-13080B for the optical surfaces of polarization modulator.
5. Measured data on metrology, surface quality, polarization performance
6. Handling, storage and cleaning instruction

**Acceptance criteria:**

Acceptance criteria, is that the polarization modulator should meet the specifications mentioned in Table 2. In case if the optional qualification for vibration and thermovac is not provided, then the vendor should provide a documentation showing that the supplied polarization modulator will survive the vibration and thermal excursions either through analysis or through heritage (with an example of previous missions in which such polarization modulators are flown in space science missions). The vibration and the thermal range for the analysis will be specified by us. In case of heritage, relevant documents describing the vibration and thermal environmental specifications of the qualification model of the polarization modulator to be provided.

**Shelf life:**

Supplied polarization modulator should have a storage shelf life of 5 years and further operational period of 5 years without any degradation in the performance. Vendor shall specify the suitable storage conditions.

**Packaging:**

Polarization modulator shall be packed in class 100 clean room compatible containers that do not make contact with optical surfaces meeting MIL-STD-1246A-level100. Packing should be done under clean room conditions.

**Expected delivery schedule:**

4 to 5 months from the date of release of purchase order.

For further information/clarifications

For any other technical clarifications, the indentor "*rajkumarn@iiap.res.in / brp@iiap.res.in*" may be contacted.

For any administrative matters, the Purchase Officer "*purchase@iiap.res.in*" may be contacted.

