REQUEST FOR PROPOSALS FOR SUPPLY OF : "Polarization Beam Displacers and Half Wave Plates"

1. **Name of the proposal:** Polarization Beam Displacers and Half Wave Plates for Visible Emission Line Coronagraph (VELC).

2. **Justification for the requirement of the item:** Visible emission line coronagraph payload on ADITYA-L1 mission is aimed at studying the solar corona from 1.05Ro to 3Ro. It has the capability of carrying out simultaneous observations of solar corona using imaging, spectroscopy and spectro-polarimetry modes. Spectro-polarimetry channel uses a rotating polarization modulator to change the state of polarization of the coronal light in known way. This coronal light is analyzed using an analyzer placed in 1074.7nm channel to measure the magnetic fields in solar corona. The components mentioned in this RFP will be used in VELC.

Polarizing Beam Displacer (PBD) and Half-Wave Plate (PBD + HWP + PBD) package

Technical specifications

Table1: Polarizing beam displacer and Half wave plate dimensions and required quantity:

S. No	Name	Size (mm)	Material	Quantity
1	PBD	15-20	Calcite crystal	20
2	Half Wave Plate	15-20	Quartz crystal	10

Table 2: Specifications of Polarizing Beam Displacer (PBD)

Specifications of PBD+HWP+PBD			
S. No	**Parameter**	**Value**	**Tolerance**
1	Physical size	15 - 20 mm (with mechanical housing)	+0/-0.1mm
2	Aperture shape	Square	
3	clear aperture	>12.5 mm diameter	
4	Material	Calcite	
5	Transmission	> 90% over ± 5nm at 1074.7 nm	
6	AR coating	optimized for 1074.7nm	
7	Beam displacement	0.9375 mm	+0/-0.025mm
8	Extinction ratio	10,000:1	
9	Beam deviation (o & e beams)	<1 arcmin	
10	Damage threshold	50 mw/cm^2 pulsed	
11	Transmission wavefront error (PTV)	≤ λ/4 on best effort basis over clear aperture; (λ: 632.8nm)	
12	Cosmetic quality	20/10	

13	Mechanical housing	Al6061 cell	
15	Operating temperature	$22^{O}C\pm 3^{O}C$	

Table 3: Specifications of Half wave plate

S. No	Parameter	Value	Tolerance
1	Physical size	15 -20 mm (with mechanical housing)	
2	Aperture shape	Circular	+0/-0.1mm
3	Clear aperture	≥12.5 mm diameter	
4	Thickness	≤ 9 mm	
5	Material	Quartz crystal	
6	AR coating	R<0.5% over ± 5nm band at 1074.7 nm	
7	Transmission	≥ 90%over ± 5nm at 1074.7nm	
8	Retardation	λ/2	
10	Central wavelength of retardance	1074.7nm (air)	
12	Beam deviation (o & e beams)	≤10" after mounting	
13	Transmission wavefront error (PTV)	<λ/4, (λ: 632.8nm)	
14	Damage threshold	100 mw/cm^2	
15	Cosmetic quality	40/20	
16	Mechanical housing	Al6061 cell	
17	Operating temperature	$22^{O}C\pm 3^{O}C$	

Additional details:

1. Exact thickness and effective index of refraction of the PBD should be provided for estimation of focal plane shifts.
2. Appropriate bevels should be provided on all edges.
3. Mechanical housing of the PBD should have scribe marks indicating planes contacting two polarizations.
4. Mechanical housing of HWP should have scribe mark indicating fast axis.
5. Optics in the mechanical housing should be secured using Teflon shims with low volatility sealant.
6. TML/RML of the sealant should be less than 1% and CVCM should be less than 0.1%.
7. Mechanical housing should have two vent ports for air to escape due to pressure difference.
8. Physical size of the mechanical housing for both PBD and HWP should be same.
9. Humidity, Adhesion, Moderate abrasion tests should be performed on coated witness coupons.

3. Deliverables

1. PBD meeting the specifications listed in Table-2, as per the quantity mentioned in Table-1.
2. HWP meeting the specifications listed in Table-3, as per the quantity mentioned in Table-1.
3. Test reports for humidity, adhesion, moderate abrasion should be supplied along with the witness coupons.
4. C of C, Material certificate, wavefront interferogram, transmission profile should be supplied along with the components

4. Delivery Schedule

4-5 months from the date of PO

5. Shelf life:

Supplied PBD and HWP should have a storage shelf life of 3 years and further operational period of 5 years without any degradation in the performance. Vendor shall specify the suitable storage conditions.

6. Packaging:

PBD and HWP should be packed in clean room compatible containers that do not make contact with optical surfaces. Containers should be sealed in cleanroom compatible polymer bags.

7. Eligibility criteria of vendor:

Vendor must have the knowledge, infrastructure and heritage in manufacturing of polarization optics with similar specifications. If any published articles or technical documents can be shared that will help us in qualifying.

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