

Visible Imaging Multi-track Spectrograph

Technical Specifications

IPR intends to procure one integrated system comprising of spectrograph, CCD detector, imaging fiber adapter, fiber bundle with a coupling ferrule and external shutter. Accordingly, the technical specifications are grouped into five categories: 1) Imaging spectrograph 2) Imaging fiber adapter and fiber array 3) CCD detector 4) System Integration, Control and Data acquisition and 5) Acceptance test

I.A) Technical specifications of Imaging Spectrograph			
Sr No	Item	Specification	Description
1	Type Mount	Visible imaging spectrograph Preferably Czerny-Turner Usable wavelength range 250 – 1200 nm	Any modified Czerny Turner complying with IPR technical specifications can also be quoted as an option.
2	F#(F-number) Focal length	5 to 7 500 – 750 mm	
3	Image distortion at the exit focal plane	No distortion (full resolution) within 10 mm × 10 mm of the image plane. Less than 25% distortion on rest of the image plane.	# <i>Image distortion means the size of the image at the focal plane after correcting all the aberrations such as spherical aberrations, astigmatism etc. The optics of spectrograph need to be chosen accordingly.</i>
4-A	Required no of gratings	Three	

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4-B	<p>Grating groove density</p> <p>Grating no. 1</p> <p>Grating no. 2</p> <p>Grating no. 3</p>	<p>1800 lines/mm holographic, optimized for visible</p> <p>1200 lines/mm</p> <p>600 lines/mm</p>	<p>1800 lines/mm blazed at 700 nm, grating efficiency $\geq 70\%$ between 500 to 1000 nm</p> <p>1200 lines/mm blazed at 500 nm, grating efficiency $\geq 70\%$ between 450 to 750 nm</p> <p>600 lines/mm blazed at 300 nm, grating efficiency $\geq 50\%$ between 300 to 450 nm</p> <p>Efficiency curves of offered gratings should be provided with quotation.</p>
4-C	Grating configuration/mount :	Turret	
5	Reciprocal Linear Dispersion(nm/mm)	<p>1.0 to 0.8 nm/mm for Grating no.1</p> <p>1.5 to 1.3 nm/mm for Grating no .2</p> <p>3.5 to 2.8 nm/mm for Grating no.3</p>	
6	Wavelength resolution with CCD detector	<p>$\leq 0.06\text{nm}$ across the focal plane for Grating no.1</p> <p>$\leq 0.08\text{nm}$ across the focal plane for Grating no. 2</p> <p>$\leq 0.15 \text{ nm}$ across the focal plane for Grating no. 3</p>	This is to be achieved, when the input slit width is nearly equal to the pixel size of the CCD detector.
7	Wavelength coverage with CCD detector	<p>13-10 nm for Grating no. 1</p> <p>20-17 nm for Grating no. 2</p> <p>45-35nm for Grating no. 3</p>	

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I.B) Entrance and exit ports with slit assembly			
1	No of entrance ports	One motorized slit assembly One manual bilateral slit	Externally controlled motorized micrometer to vary the slit width. Please specify slit step size for each case.
2	Slit height	Appropriately chosen to accommodate all the dependent specifications.	Appropriately chosen to accommodate all the dependent specifications.
3	No of exit ports	One for mounting CCD detector One manual bilateral slit assembly	The additional exit port should be similar to the manual slit assembly used at the entrance port.
4	Diverter mirror	One at Entrance One at Exit	To select entrance and exit port
I.C) External shutter			
1	Shutter	Shutter for entire CCD exposure	Shutter mounting location needs to be mentioned in the quote.
2	Shutter Opening and Closing time	$\leq 20\text{ms}$	The shutter in open condition should illuminate the entire CCD. The shutter in closed condition should totally obstruct the CCD.

II) Technical specifications of fiber adapter and fiber array

Sr no	Item	Specification	Description
1	Optical fiber array terminated with a common ferrule.	A vertical array of minimum 10 optical fibers. At one end, the array has to be terminated with a common ferrule. At the other end, each fiber has to be separately terminated with a SMA connector.	A Compatible ferrule with the quoted fiber adapter.
2	Optical fiber	Type : Multimode Single core Silica Core diameter : 600 micron Length: 2 meters with standard SMA terminations.	
3	Fiber adapter	To couple light to the input of the spectrograph Should have provisions for transverse and longitudinal adjustments.	Vendor can suggest alternative coupling mechanisms, if any, for coupling the fiber array to the input of the spectrograph and quote for the same.

III) Technical specifications of CCD detector

Sr no	Item	Specification	Description
1	Grade	Scientific grade, Grade 1	
2	Type	Back Illuminated	
3	Minimum individual pixel size	12 μm	

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4	Dimension	> (13 mm × 13 mm)	The quoted model should be compatible to record the images of input fiber array at the slit meeting IPR's imaging, reciprocal linear dispersion and wavelength resolution specifications.
5	Sealing	Hermetically sealed /All metallic vacuum sealing	Permanent vacuum and Maintenance free
6	Head Cooling	TE cooled up to -50 deg C or better	
7	Dark current (e/p/s)	≤ 0.0004	At the best achievable cooling available with the detector
8	Quantum Efficiency	≥ 60% in the range 400 – 700 nm	Quantum efficiency curves should be furnished along with quotation
9	Read out rate	≥ 2 MHz	
10	Frame rate	At least ~1 frame/sec in full chip read out mode	

IV) System Integration, Control and Data Acquisition

Sr. no	Item	Specification	Description
1	CCD integration with Spectrograph	CCD coupling flange to spectrograph	
2	Wavelength calibration	The wavelength calibration method should be available in instrument's operational software.	
3	Data acquisition and Control	Windows based software to operate and control the integrated system including shutter. The integrated system should be operable in synchronization with an external trigger.	LabVIEW drivers may be provided if available (optional).

Additional requirements:

1. All the cables, tools and power supplies (~220 V and 50Hz) have to be provided by vendor.
2. All the technical manuals and along with the operation manual for hard ware and software have to be provided by the vendor during commissioning at IPR.

V. Acceptance criteria (details given in Appendix)

The final acceptance of the integrated systems will be given after the following two tests:

1. Pre-dispatch test at factory site by the vendor.
2. Final acceptance test at IPR.

Part I: Pre-dispatch test at factory site by the vendor:

Vendor will carry out detailed test and evaluation of the instruments as per Appendix, in which details of the relevant acceptance test procedures are described. The vendor will send a detailed test report to IPR before the dispatch of the equipment. The test report will be evaluated by IPR and if found satisfactory, IPR will send the dispatch clearance certificate.

Part II: Acceptance Test at IPR:

At IPR, installation, testing and demonstration of the instruments and its performance should be carried out by the vendor. After successful commissioning at IPR, acceptance will be given only when it complies with all the technical specifications and reproduces the same results that were obtained during the pre-dispatch test by the vendor at their factory site.

IMP NOTE: Vendor should provide Bill of Material/List of items included in one system and submit it alongwith the technical bid.

Date :-

Bidder's Sign and Stamp