



राष्ट्रीय विज्ञान शिक्षा एवं अनुसंधान संस्थान, भुवनेश्वर  
(परमाणु उर्जा विभाग, भारत सरकार का एक स्वयं शासित संस्थान)  
**NATIONAL INSTITUTE OF SCIENCE EDUCATION AND RESEARCH, BHUBANESWAR**  
(AN AUTONOMOUS INSTITUTE UNDER DEPT. OF ATOMIC ENERGY, GOVT. OF INDIA)

***Notice Inviting E-Tender No.: C-001439-RIN4001-SPS-21-22***

**OPTICAL ITEMS**



**NATIONAL INSTITUTE OF SCIENCE EDUCATION & RESEARCH  
JATNI CAMPUS, P.O. – BHIMPUR-PADANPUR, VIA-JATNI  
KHURDA – 752050, ODISHA, INDIA**

**Notice Inviting E-Tender**

**For**

**OPTICAL ITEMS**

E- Tenders are invited on behalf of the Director, National Institute of Science Education and Research, Jatni from the manufacturers (Indian or Foreign) and their authorised reseller/Indian agent only for supply & installation of the following items:-

<i>Sl. No.</i>	<i>Name of the Items</i>	<i>Tender No.</i>	<i>Name of Department</i>	<i>Qty. Pkts.</i>	<i>Tender Fee in INR</i>
1.	<b>OPTICAL ITEMS</b> (As listed in the technical bid)	C-001439- RIN4001-SPS- 21-22	SPS	As per technical bid	1500.00

<i>Sl. No.</i>	<i>Name of the Items</i>	<i>Tender No.</i>	<i>Name of Department</i>	<i>Qty. Pkts.</i>	<i>EMD in INR</i>
1.	<b>OPTICAL ITEMS</b> (As listed in the technical bid)	C-001439- RIN4001-SPS- 21-22	SPS	As per technical bid	NIL against Bid Security Declaration

**NB: I. PARTIES HAVE TO QUOTE FOR ALL THE ITEMS OTHERWISE THEIR BIDS WILL NOT BE CONSIDERED.**

- Tender Enquiry No :C-001439-RIN4001-SPS-21-22
- Last date of submission of E-bid :31/01/2022 up to 11.00 A.M
- Opening of Technical Bid :02/02/2022 at 11.00 A.M

The details of general tender terms & conditions can be downloaded from <https://eprocure.gov.in/epublish/app> or Tender Free View Link from NISER Website <https://www.niser.ac.in/content/tender>.

**FIC (Stores & Purchase)**

# **Bid Security Declaration**

**(In Company's letterhead)**

**Invitation to Bid/Request for Expression of Interest No.**

**[C-001439-RIN4001-SPS-21-22]**

**To**

**National Institute of Science Education & Research, Bhubaneswar**

**Post-Bhimpur-Padanpur,**

**Via- Jatni,**

**District- Khurda, India**

**PIN-752050.**

**I/We understand that, according to your NIT conditions, bids must be supported by a Bid Security. In lieu of the Bid Security, we submit the following undertaking:-**

**“I/We declare that we will be suspended/ disqualified for tendering with the entity for a period of 1 (One) year from the date of receipt of notice from you, if we withdraw or modify our bid during the validity period OR fail to sign the Contract OR fail to submit Performance Security (if applicable) before the defined deadline OR fail to execute contractual obligation within the stipulated time.”**

**Date: - Signature of the Bidder**

**Place: - (with Company seal)**



**TECHNICAL BID  
SUPPLY OF  
OPTICAL ITEMS  
FOR**

**NATIONAL INSTITUTE OF SCIENCE EDUCATION AND RESEARCH, JATNI**  
**Notice Inviting E-Tender No. C-001439-RIN4001-SPS-21-22**

Vendor Name				
SL. No.	Item Specification	Quantity (In Nos.)	Accepted/Not Accepted (Kindly Mention)	Please specify if any deviation
1	<p><b>Ø2" N-BK7 Broadband Precision Window-</b></p> <p>Size: 2.00", Size Tolerance: +0.0 / -0.2 mm, Thickness: 12.0 mm, Thickness Tolerance: ±0.3 mm, Surface Flatness: <math>\lambda/10</math> over CA, AR Coating Range: 650 - 1050 nm (-B Coating) Reflectance over AR Coating Range: <math>R_{avg} &lt; 0.5\%</math> Damage Threshold: 7.5 J/cm<sup>2</sup> at 810 nm, 10 ns, 10 Hz, Ø0.144 mm</p>	1 No.		
2	<p><b>Ø2" Mid-Infrared Enhanced Gold Mirror</b></p> <p>Damage Threshold: Pulsed - 0.1 J/cm<sup>2</sup> at 1.064 <math>\mu</math>m, 10 ns, 10 Hz, Ø1.06 mm 3.0 J/cm<sup>2</sup> at 10.6 <math>\mu</math>m, 100 ns, 1 Hz, Ø1.29 mm Diameter: 50.8 mm, Diameter Tolerance: +0.0 mm / -0.1 mm Thickness: 12.0 mm, Thickness Tolerance: ±0.2 mm Clear Aperture: &gt; Ø45.7 mm Reflectance: <math>R_{avg} &gt; 98\%</math>, <math>R_{abs} &gt; 95\%</math> from 2 <math>\mu</math>m to 20 <math>\mu</math>m @ 0° to 45° AOI</p>	1 No.		
3	<p><b>Wollaston Prism, 20° Beam Separation-</b></p> <p>Damage Threshold: Pulsed - 5 J/cm<sup>2</sup> (1064 nm, 10 ns, 10 Hz, Ø0.476 mm) Extinction Ratio: &gt;100 000:1, Substrate Wavelength Range: 350 nm to 2.3 <math>\mu</math>m, Beam Separation Angle (Typical): 20° at 633 nm, Coating: AR Coated (650 - 1050 nm), Clear Aperture: Ø10.0 mm, Transmitted Wavefront Error</p>	1 No.		

4	<p><b>Ø2" 90° Off-Axis Parabolic Mirror with Ø3 mm Hole Parallel to Focused Beam-</b></p> <p>Diameter: 50.8 mm, Thickness: 62.8 mm  Reflected Focal Length: 101.6 mm, Parent Focal Length: 50.8 mm Hole Diameter: 3 mm on Coated Surface, 8 mm on Back of Substrate Reflected Wavefront Error (RMS): 96% from 800 nm to 20 µm Off-Axis Angle: 90°, Clear Aperture: &gt; 90% of Diameter, Not Including Hole Surface Roughness (RMS) : &lt;100 Å, Surface Quality: 40-20 Scratch-Dig Parent Focal Length Tolerance: ±1%,</p>	1 No.		
5	<p><b>Ø2" 90° Off-Axis Parabolic Mirror-</b></p> <p>Diameter: 50.8 mm, Thickness: 62.8 mm  Reflected Focal Length: 152.4 mm, Parent Focal Length: 76.2 mm Reflected Wavefront Error (RMS): 96% from 800 nm to 20 µm Off-Axis Angle: 90°, Surface Roughness (RMS): &lt; 100 Å Clear Aperture: &gt; 90% of Diameter, Surface Quality: 40-20 Scratch-Dig Parent Focal Length Tolerance: ±1%, Reflected Focal Length Tolerance: ±1%</p>	4 Nos.		
6	<p><b>Plano-Convex Lens, Ø1", f = 75 mm-</b></p> <p>Damage Threshold Specification: Pulsed - 0.5 J/cm<sup>2</sup> (1064 nm, 10 ns, 10 Hz, Ø1 mm)  Wavelength Range: 600 - 2700 nm, Clear Aperture: Ø10.0 mm (Ø 0.39") Housing Diameter: 1.00" (25.4 mm), Housing Thickness: 0.40" (10.2 mm) Angle of Incidence (AOI): 0°, AR Coating Range: 600 - 2700 nm (R_avg &lt; 1.5% per Outer Surface)</p>	1 No.		
7	<p><b>Plano-Convex Lens, Ø1", f = 100 mm-</b></p> <p>Damage Threshold Specification: Pulsed - 0.5 J/cm<sup>2</sup> (1064 nm, 10 ns, 10 Hz, Ø1 mm)  Wavelength Range: 600 - 2700 nm, Clear Aperture: Ø10.0 mm (Ø 0.39") Housing Diameter: 1.00" (25.4 mm), Housing Thickness: 0.40" (10.2 mm) Angle of Incidence (AOI): 0°, AR Coating Range: 600 - 2700 nm (R_avg &lt; 1.5% per Outer Surface)</p>	2 Nos.		

8	<p><b>Plano-Convex Lens, Ø1", f = 150 mm-</b></p> <p>Damage Threshold Specification: Pulsed - 0.5 J/cm<sup>2</sup> (1064 nm, 10 ns, 10 Hz, Ø1 mm)  Wavelength Range: 600 - 2700 nm, Clear Aperture: Ø10.0 mm (Ø 0.39") Housing Diameter: 1.00" (25.4 mm), Housing Thickness: 0.40" (10.2 mm) Angle of Incidence (AOI): 0°, AR Coating Range: 600 - 2700 nm (R_avg &lt; 1.5% per Outer Surface)</p>	3 Nos.		
9	<p><b>Mounted Superachromatic half-Wave Plate-</b></p> <p>Damage Threshold Specification: Pulsed - 0.5 J/cm<sup>2</sup> (1064 nm, 10 ns, 10 Hz, Ø1 mm)  Wavelength Range: 600 - 2700 nm, Clear Aperture: Ø10.0 mm (Ø 0.39") Housing Diameter: 1.00" (25.4 mm), Housing Thickness: 0.40" (10.2 mm) Angle of Incidence (AOI): 0°, AR Coating Range: 600 - 2700 nm (R_avg &lt; 1.5% per Outer Surface), Transmitted Wavefront Error: &lt;λ/4 at 633 nm</p>	2 Nos.		
10	<p><b>Mounted Superachromatic Quarter-Wave Plate-</b></p> <p>Damage Threshold Specification: Pulsed - 0.5 J/cm<sup>2</sup> (1064 nm, 10 ns, 10 Hz, Ø1 mm)  Wavelength Range: 600 - 2700 nm, Clear Aperture: Ø10.0 mm (Ø 0.39") Housing Diameter: 1.00" (25.4 mm), Housing Thickness: 0.40" (10.2 mm) Angle of Incidence (AOI): 0°, AR Coating Range: 600 - 2700 nm (R_avg &lt; 1.5% per Outer Surface), Transmitted Wavefront Error: &lt;λ/4 at 633 nm</p>	2 Nos.		
11	<p><b>Cube-Mounted Pellicle Beamsplitter, 8:92 (R:T), Uncoated, 400 - 2400 nm-</b></p> <p>Ports: 4, all SM1 Threaded (1.035"-40)  Membrane Material: Nitrocellulose Housing Material: Engraved Black Anodized Aluminum  Transmitted Wavefront Error : 0.5λ (Typical)  Reflected Wavefront Error : 1λ (Typical)</p>	1 No.		

12	<p><b>30 mm Cage Cube-Mounted Pellicle Beamsplitter, 45:55 (R:T), 700-900 nm-</b></p> <p>Ports: 4, all SM1 Threaded (1.035"-40)  Membrane Material: Nitrocellulose Housing  Material: Engraved Black Anodized Aluminum  Transmitted Wavefront Error : <math>0.5\lambda</math> (Typical)  Reflected Wavefront Error : <math>1\lambda</math> (Typical)</p>	1 No.		
13	<p><b>Ultrafast-Enhanced Silver Mirrors for 750 - 1000 nm-</b></p> <p>Wavelength Range: 750 - 1000 nm  Reflectance: <math>R_s &gt; 99.0\%</math>, and <math>R_p &gt; 98.5\%</math>  Group Delay Dispersion: S-Pol: <math> GDD  &lt; 20</math> fs<sup>2</sup>, P-Pol: <math> GDD  &lt; 30</math> fs<sup>2</sup>  Angle of Incidence: <math>45^\circ</math> Relative to Coated Face  Laser Induced Damage Threshold: <math>0.39</math> J/cm<sup>2</sup> (800 nm, 52 fs FWHM, S-Pol, 1 Pulse)  <math>0.18</math> J/cm<sup>2</sup> (800 nm, 52 fs FWHM, S-Pol, 1000 Pulses)</p>	25 Nos.		
14	<p><b>Magnesium Fluoride optical window-</b></p> <p>Diameter = <math>\varnothing 2"</math>, Thickness = 3 mm - 6 mm,  120 nm- 7000 nm, Transmission <math>&gt; 95\%</math>,  Surface flatness <math>&gt; \lambda/2</math></p>	4 Nos.		
15	<p><b>Enhanced Rubidium 87 [87Rb] reference cell-</b></p> <p>Enhanced Rubidium 87 [87Rb], Quartz Reference Cell, <math>\varnothing 19</math> mm x 75 mm</p>	1 No.		
16	<p><b>Rubidium Reference Cell-</b></p> <p>Rubidium Borosilicate Reference Cell, <math>\varnothing 25.4</math> mm x 71.8 mm</p>	4 Nos.		
17	<p><b>Scanning Fabry-Perot Interferometer-</b></p> <p>Finesse <math>\geq 1500</math>, 630 - 824 nm, 1.5 GHz FSR,  Ultra stable Athermal Invar cavity SMA to BNC cable included</p>	1 No.		
18	<p><b>Multimode Fiber Patch Cable, 5 m-</b></p> <p><math>\varnothing 105</math> <math>\mu</math>m, 0.22 NA, Low OH, FC/PC-FC/PC  Fiber Patch Cable, 5 m, 700 nm to 1100 nm</p>	4 Nos.		

19	<b>Multimode Fiber Patch Cable, 2 m-</b> Ø105 µm, 0.10 NA, Low OH, FC/PC-FC/PC Fiber Patch Cable, 2 m, 700 nm to 1100 nm	5 Nos.		
20	<b>50:50 (R:T) NPBS Cube-50:50 (R:T) NPBS Cube</b> N-BK7 50:50 Non-Polarizing Beamsplitter Cube, 700 - 1100 nm, 1/2", AR coated	4 Nos.		
21	<b>70:30 (R:T) NPBS Cube-</b> N-BK7 70:30 (R:T) Non-Polarizing Beamsplitter Cube, 700 - 1100 nm, 1/2", AR coated	2 Nos.		
22	<b>90:10 (R:T) NPBS Cube-</b> N-BK7 90:10 (R:T) Non-Polarizing Beamsplitter Cube, 700 - 1100 nm, 1/2", AR coated	2 Nos.		
23	<b>1x2 Multimode Fiber Optic Coupler, 50:50 Split-</b> High OH, Ø200 µm Core, 0.22 NA, 50:50 Split, FC/PC, 400 nm -900 nm	4 Nos.		
24	<b>1x2 PM Coupler, 50:50 Split-</b> 1x2 PM Coupler, 780 ± 15 nm, 50:50 Split, ≥18 dB PER, FC/PC Connectors	2 Nos.		
25	<b>Mounted Multi-Order Half-Wave Plate for Ø1/2"-</b> Ø1/2" Mounted Multi-Order Half-Wave Plate, Ø1" Mount, 780 nm, AR coated	5 Nos.		
26	<b>Multi-Order Half-Wave Plate for Ø1"-</b> Ø1" Multi-Order Half-Wave Plate, SM1- Threaded Mount, 780 nm, AR coated	5 Nos.		
27	<b>Zero-Order Half-Wave Plate for Ø1"-</b> Ø1" Zero-Order Half-Wave Plate, SM1- Threaded Mount, 780 nm, AR coated	5 Nos.		



28	<b>Zero-Order Half-Wave Plate for Ø1/2"-</b> Ø1/2" Zero-Order Half-Wave Plate, SM05-Threaded Mount, 780 nm, AR coated	5 Nos.		
29	<b>Linear Polarizer-</b> Ø1" Linear Polarizer with N-BK7 Windows, 600-1100 nm	5 Nos.		
30	<b>Plano-Convex Lens-50mm-</b> N-BK7 Plano-Convex Lens, Ø1", f = 50 mm, AR Coating: 650 - 1050 nm	10 Nos.		
31	<b>Plano-Convex Lens-</b> N-BK7 Plano-Convex Lens, Ø1", f = 75 mm, AR Coating: 650 - 1050 nm	5 Nos.		
32	<b>UVFS-ND-F-Box with 10 UVFS Reflective 25 mm ND Filters, SM1-Mounted, 200 - 1200 nm</b> Box with 10 UVFS Reflective, Diameter 25 mm ND Filters, SM1-Mounted, 200 - 1200 nm	2 Nos.		
33	<b>Preferable Make of the items is M/s Thorlabs Inc. / Edmund Optics</b>			
34	Above items should carry free warranty as per OEM.			

**NOTE: "THE ADDITIONAL AND DETAILED SPECIFICATION REQUIREMENTS FOR EACH OF THE ITEMS ARE ATTACHED BELOW."**

**Contact for information: (Only E-mail enquiries will be entertained)**

**For Technical Information:-**

**Dr. Shovon Pal**

School of Physical Sciences

E-mail – Dr. Shovon Pal < shovon.pal@niser.ac.in >

**ADDITIONAL SPECIFICATION**

**ANNEXURE-I**

**Specifications for Optical components:**

Sl. No.	Part	Features/Specifications	Qty.
01	Ø2" N-BK7 Broadband Precision Window	Size: 2.00", Size Tolerance: +0.0 / -0.2 mm, Thickness: 12.0 mm, Thickness Tolerance: ±0.3 mm, Surface Flatness: $\lambda/10$ over CA, AR Coating Range: 650 - 1050 nm (-B Coating) Reflectance over AR Coating Range: $R_{avg} < 0.5\%$ Damage Threshold: 7.5 J/cm <sup>2</sup> at 810 nm, 10 ns, 10 Hz, Ø0.144 mm	1
02	Ø2" Mid-Infrared Enhanced Gold Mirror	High Reflectance from 2 µm to 20 µm Surface Flatness: $\lambda/10$ at 633 nm Protective Overcoat per MIL-C-48497A Damage Threshold: Pulsed - 0.1 J/cm <sup>2</sup> at 1.064 µm, 10 ns, 10 Hz, Ø1.06 mm 3.0 J/cm <sup>2</sup> at 10.6 µm, 100 ns, 1 Hz, Ø1.29 mm Diameter: 50.8 mm, Diameter Tolerance: +0.0 mm / -0.1 mm Thickness: 12.0 mm, Thickness Tolerance: ±0.2 mm Clear Aperture: > Ø45.7 mm Reflectance: $R_{avg} > 98\%$ , $R_{abs} > 95\%$ from 2 µm to 20 µm @ 0° to 45° AOI	1
03	Wollaston Prism, 20° Beam Separation	Separates Unpolarised Light into Two Orthogonally Polarized Outputs Ø10 mm Clear Aperture Mounted in Ø1" Housing. Damage Threshold: Pulsed - 5 J/cm <sup>2</sup> (1064 nm, 10 ns, 10 Hz, Ø0.476 mm) Extinction Ratio: >100 000:1, Substrate Wavelength Range: 350 nm to 2.3 µm, Beam Separation Angle (Typical): 20° at 633 nm, Coating: AR Coated (650 - 1050 nm ), Clear Aperture : Ø10.0 mm, Transmitted Wavefront Error : < $\lambda/4$ at 632.8 nm, Surface Quality : 20-10 Scratch-Dig, Substrate : Scatter-Free Calcite	1
04	Ø2" 90° Off-Axis Parabolic Mirror with Ø3 mm Hole Parallel to Focused Beam	Centred Hole for Through Beam. Parallel to Focused Beam: Ø8 mm Entrance Hole in Back Tapers Down to Ø3 mm Hole in Mirror Surface. Reflected Beam is Focused without Spherical or Chromatic Aberrations. Diameter: 50.8 mm, Thickness: 62.8 mm Reflected Focal Length: 101.6 mm, Parent Focal Length: 50.8 mm Hole Diameter: 3 mm on Coated Surface, 8 mm on Back of Substrate Reflected Wavefront Error (RMS): < $\lambda/4$ at 633 nm Metallic Coating: Protected Gold Reflectance (Average): >96% from 800 nm to 20 µm	1

		<p>Off-Axis Angle: 90°, Clear Aperture: &gt;90% of Diameter, Not Including Hole</p> <p>Surface Roughness (RMS) : &lt;100 Å</p> <p>Surface Quality: 40-20 Scratch-Dig</p> <p>Parent Focal Length Tolerance: ±1%, Reflected Focal Length Tolerance : ±1%,</p> <p>Substrate: Aluminium, Manufacturing Process: Diamond Turned</p>	
05	Ø2" 90° Off-Axis Parabolic Mirror	<p>&gt;96% Average Reflectance Over a Broadband Range from 800 nm to 20 µm.</p> <p>Collimates a Divergent Source or Focuses a Collimated Beam without Spherical or Chromatic Aberrations.</p> <p>Surface Roughness: &lt;100 Å (RMS)</p> <p>Clear Aperture: &gt;90% of Diameter</p> <p>Diameter: 50.8 mm, Thickness: 62.8 mm</p> <p>Reflected Focal Length: 152.4 mm, Parent Focal Length: 76.2 mm</p> <p>Reflected Wavefront Error (RMS): &lt;λ/4 at 633 nm</p> <p>Bottom mounting holes: 8-32 taps in radial pattern (three places)</p> <p>Metallic Coating: Protected Gold</p> <p>Reflectance (Average): &gt;96% from 800 nm to 20 µm</p> <p>Off-Axis Angle: 90°, Clear Aperture: &gt;90% of Diameter</p> <p>Surface Roughness (RMS) : &lt;100 Å, Surface Quality: 40-20 Scratch-Dig</p> <p>Parent Focal Length Tolerance: ±1%, Reflected Focal Length Tolerance : ±1%,</p> <p>Substrate: Aluminium, Manufacturing Process: Diamond Turned</p>	4
06	N-BK7 Plano-Convex Lens, Ø1", f = 75 mm	<p>Material: N-BK7</p> <p>AR-Coated for the 650 - 1050 nm Range</p> <p>Lens Shape: Plano-Convex</p> <p>Reflectance over Coating Range (Avg.) @ 0° AOI : &lt;0.5%</p> <p>Surface Flatness (Plano Side): λ/2 (at 633 nm)</p> <p>Spherical Surface Power (Convex Side): 3λ/2 (at 633 nm)</p> <p>Surface Irregularity (Peak to Valley): λ/4 (at 633 nm)</p>	1
07	N-BK7 Plano-Convex Lens, Ø1", f = 100 mm	<p>Surface Quality: 40-20 Scratch-Dig, Thickness Tolerance: ±0.1 mm,</p> <p>Diameter Tolerance: +0.0 / -0.1 mm, Centration: &lt;3 arcmin</p>	2
08	Plano-Convex Lens, Ø1", f = 150 mm	<p>Damage Threshold: 7.5 J/cm<sup>2</sup> (810 nm, 10 ns, 10 Hz, Ø0.144 mm)</p> <p>Clear Aperture: &gt;90% of Diameter, Focal Length Tolerance: ±1%</p>	3
09	Mounted Superachromatic Half-Wave Plate	<p>Accurate Retardance over a Super Broadband Range</p> <p>Quarter/Half-Wave Plates for 600 - 2700 nm</p>	2

10	Mounted Superachromatic Quarter-Wave Plate	<p>Ø10.0 mm Clear Aperture, Mounted in a Ø1" Engraved Housing</p> <p>Damage Threshold Specification: Pulsed - 0.5 J/cm<sup>2</sup> (1064 nm, 10 ns, 10 Hz, Ø1 mm)</p> <p>Wavelength Range: 600 - 2700 nm, Clear Aperture: Ø10.0 mm (Ø 0.39")</p> <p>Housing Diameter: 1.00" (25.4 mm), Housing Thickness: 0.40" (10.2 mm)</p> <p>Angle of Incidence (AOI): 0°, AR Coating Range: 600 - 2700 nm (R_avg &lt; 1.5% per Outer Surface), Transmitted Wavefront Error: &lt;math&gt;\lambda/4&lt;/math&gt; at 633 nm</p> <p>Beam Deviation : &lt;math&gt;&lt;3&lt;/math&gt; arcmin, Surface Quality : 40-20 Scratch-Dig</p> <p>Material : Crystalline Quartz and Magnesium Fluoride</p>	2
11	Cube-Mounted Pellicle Beamsplitter, 8:92 (R:T), Uncoated, 400 - 2400 nm	<p>Eliminates Ghosting.</p> <p>No Chromatic Aberration with Focused Beams. Minimal Change in Optical Path Length. 30 mm Cage System Compatible.</p>	1
12	30 mm Cage Cube-Mounted Pellicle Beamsplitter, 45:55(R:T), 700-900 nm	<p>Ports: 4, all SM1 Threaded (1.035"-40)</p> <p>Membrane Material: Nitrocellulose</p> <p>Housing Material: Engraved Black Anodized Aluminium</p> <p>Transmitted Wavefront Error : 0.5<math>\lambda</math> (Typical)</p> <p>Reflected Wavefront Error: 1<math>\lambda</math> (Typical)</p>	1
13	Ultrafast-Enhanced Silver Mirrors for 750 - 1000 nm	<p>Wavelength Range: 750 - 1000 nm</p> <p>Reflectance: R<sub>s</sub> &gt; 99.0%, and R<sub>p</sub> &gt; 98.5%</p> <p>Group Delay Dispersion: S-Pol:  GDD  &lt; 20 fs<sup>2</sup>, P-Pol:  GDD  &lt; 30 fs<sup>2</sup></p> <p>Angle of Incidence: 45° Relative to Coated Face</p> <p>Laser Induced Damage Threshold:</p> <p>0.39 J/cm<sup>2</sup> (800 nm, 52 fs FWHM, S-Pol, 1 Pulse)</p> <p>0.18 J/cm<sup>2</sup> (800 nm, 52 fs FWHM, S-Pol, 1000 Pulses)</p>	25

14	Magnesium Fluoride optical window	Substrate: Magnesium Fluoride (MgF <sub>2</sub> ) Wavelength range: 120nm-7000nm Diameter: 50.8 mm ± 0.1 Thickness: 3 mm – 6 mm Surface quality: 40 - 20 Surface flatness: >λ/2 Transmission: >95% Abbe Number (vd): 106.22 Bevel: Protective as needed Clear Aperture (%): 90 Coating: Uncoated Coefficient of Thermal Expansion CTE (10 <sup>-6</sup> /°C): 13.7 Density (g/cm <sup>3</sup> ): 3.18 Edges: Fine Ground Index of Refraction nd: 1.377 Knoop Hardness (kg/mm <sup>2</sup> ): 415 Parallelism (arcmin): <1 Poisson's Ratio: 0.271 Young's Modulus (GPa): 138	4
15	Enhanced Rubidium 87 [87Rb] reference cell	Material: Quartz Cell Diameter: Ø19.0 mm Cell Length: 75.0 mm Pressure @ 25 °C: > 0.1-1.2 Torr Fill Stem: <10 mm	1
16	Rubidium Reference Cell	Material: Borosilicate Glass Cell Diameter: 25.4 mm, Cell Length: 71.8 mm Pressure @ 25 °C: >10 <sup>-7</sup> Torr Fill Stem: <10 mm Minimum Transmission (350 nm - 2.2 µm): >84%	4
17	Scanning Fabry-Perot Interferometer	Total Finesse: ≥1500 Wavelength Range: 630 - 824 nm Free Spectral Range: 1.5 GHz Near-Confocal Fabry-Perot Design with Sub-MHz Resolution 10% to 20% On-Resonance Transmission (Typical) Ultrastable Athermal Invar Cavity Low Scan Voltage (2.5 V per FSR @ 633 nm) SMA-to-BNC Cable Included	1
18	Multimode Fibre Patch Cable, 5 m	Core Diameter: 105 µm Cladding Diameter: 125 ± 1 µm Coating Diameter: 250 ± 10 µm NA: 0.22 Wavelength Range: 700 to 1100 nm Low OH FC/PC-FC/PC Fibre Patch Cable Length: 5 m	4
19	Multimode Fibre Patch Cable, 2 m	Core Diameter: 105 Cladding Diameter: 125 ± 2 µm Coating Diameter: 250 ± 10 µm NA: 0.100 ± 0.015	5

		Wavelength Range: 700 to 1100 nm Low OH FC/PC-FC/PC Fibre Patch Cable , Length: 2 m	
20	50:50 (R:T) Non-Polarizing Beamsplitter Cube	Substrate Material: N-BK7 Split Ratio: 50:50 Wavelength Range: 700 - 1100 nm Cube Side Length: 1/2" AR Coating On Both Input and Output Faces Wavefront Error: $<\lambda/4$ Transmitted Beam Deviation: $<5$ arcmin	4
21	70:30 (R:T) Non-Polarizing Beamsplitter Cube	Substrate Material: N-BK7 Split Ratio: 70:30 Wavelength Range: 700 - 1100 nm Cube Side Length: 1/2" AR Coating On Both Input and Output Faces Wavefront Error: $<\lambda/4$ Transmitted Beam Deviation: $<5$ arcmin	2
22	90:10 (R:T) Non-Polarizing Beamsplitter Cube	Substrate Material: N-BK7 Split Ratio: 90:10 Wavelength Range: 700 - 1100 nm Cube Side Length: 1/2" AR Coating On Both Input and Output Faces Wavefront Error: $<\lambda/4$ Transmitted Beam Deviation: $<5$ arcmin	2
23	1x2 Multimode Fibre Optic Coupler, 50:50 Split	Wavelength Range: 400 - 900 nm (High OH) Core / Cladding Diameter: 200 $\mu\text{m}$ / 220 $\mu\text{m}$ Fibre Width: 0.22 NA Coupling Ratio: 50:50 Termination: FC/PC Insertion Loss: $\leq 4.1$ dB / $\leq 4.1$ Db Excess Loss: $\leq 0.6$ dB Max Power Level: 5 W (With Connectors or Bare Fibre ), 10 W (Spliced)	4
24	1x2 PM Coupler, 50:50 Split	1x2 Polarization-Maintaining (PM) Fibre Couplers Centre Wavelength: 780 nm Bandwidth: $\pm 15$ nm Split Ratio: 50:50 Polarization Extinction Ratio: $\geq 18$ dB per FC/PC Connectors Insertion Loss: $\leq 1.0$ dB / $\leq 11.0$ dB Excess Loss: $\leq 0.5$ dB	2
25	Mounted Multi-Order Half-Wave Plate for $\varnothing 1/2$ "	$\varnothing 1/2$ " Wave Plate Mounted in an Anodized Aluminium Housing Mounted Diameter: 25.4 mm (1.00") AR Coating: 780 nm AR Coated on Front and Back Surfaces Clear Aperture: $\varnothing 10.0$ mm ( $\varnothing 0.39$ " ) Retardance Accuracy: $<\lambda/200$ Transmitted Wavefront Error: $\lambda/10$ @ 633 nm Material: Crystalline Quartz	5

		<p>Beam Deviation: &lt;10 arcsec  Surface Quality: 20-10 Scratch-Dig  Reflectance (per Surface): &lt;0.25%  Damage threshold: 0.448 J/cm<sup>2</sup> (797 nm, 180 fs, 1 kHz, Ø0.178 mm)  10 J/cm<sup>2</sup> (810 nm, 10 ns, 10 Hz, Ø0.055 mm)</p>	
26	Multi-Order Half-Wave Plate for Ø1"	<p>Ø1" Wave Plate  SM1-Threaded Mount  AR Coating: 780 nm AR coated  Clear Aperture: Ø22.6 mm (Ø0.89")  Retardance Accuracy: &lt;math&gt;\lambda/200&lt;/math&gt;  Transmitted Wavefront Error: <math>\lambda/10</math> @ 633 nm  Material: Crystalline Quartz  Beam Deviation: &lt;10 arcsec  Surface Quality: 20-10 Scratch-Dig  Reflectance (per Surface): &lt;0.25%  Damage threshold: 0.448 J/cm<sup>2</sup> (797 nm, 180 fs, 1 kHz, Ø0.178 mm)  10 J/cm<sup>2</sup> (810 nm, 10 ns, 10 Hz, Ø0.055 mm)</p>	5
27	Zero-Order Half-Wave Plate for Ø1"	<p>Ø1" Zero-Order Half-Wave Plate  Mounted in housings with internal and external SM1 Threads  Design Wavelength: 780 nm AR coated  Clear Aperture: Ø22.6 mm (Ø0.89")  Retardance Accuracy: &lt;math&gt;\lambda/300&lt;/math&gt;  Transmitted Wavefront Error: <math>\lambda/4</math> @ 633 nm  Material: Crystalline Quartz  Beam Deviation: &lt;10 arcsec  Surface Quality: 20-10 Scratch-Dig  Reflectance @ Design Wavelength (per Surface): &lt;0.25%  Damage threshold: 0.448 J/cm<sup>2</sup> (797 nm, 180 fs, 1 kHz, Ø0.178 mm)  10 J/cm<sup>2</sup> (810 nm, 10 ns, 10 Hz, Ø0.055 mm)</p>	5
28	Zero-Order Half-Wave Plate for Ø1/2"	<p>Ø1/2" Zero-Order Half-Wave Plate  Mounted in housings with internal and external SM05 threads  Design Wavelength: 780 nm AR coated  Clear Aperture: Ø10.0 mm (Ø0.39")  Retardance Accuracy: &lt;math&gt;\lambda/300&lt;/math&gt;  Transmitted Wavefront Error: &lt;math&gt;\lambda/8&lt;/math&gt; @ 633 nm  Material: Crystalline Quartz  Beam Deviation: &lt;10 arcsec  Surface Quality: 20-10 Scratch-Dig  Reflectance @ Design Wavelength (per Surface): &lt;0.25%  Damage threshold: 0.448 J/cm<sup>2</sup> (797 nm, 180 fs, 1 kHz, Ø0.178 mm)  10 J/cm<sup>2</sup> (810 nm, 10 ns, 10 Hz, Ø0.055 mm)</p>	5
29	Linear Polarizer	<p>Size: Ø1"  Thickness: 3 mm  Window Material: N-BK7  Wavelength Range: 600 - 1100 nm</p>	5

		Damage Threshold : 1 W/cm (810 nm, CW, Ø0.004 mm), 0.15 J/cm <sup>2</sup> (810 nm, 10 ns, 10 Hz, Ø0.08 mm)	
30	Plano-Convex Lens, f = 50 mm	Material: N-BK7 Diameter: 1" Focal Length: 50 mm AR-Coated for the 650 - 1050 nm range Radius of Curvature: 25.8 mm Reflectance over Coating Range (Avg.) @ 0° AOI: <0.5% Surface Flatness (Plano Side): $\lambda/2d$ Spherical Surface Power (Convex Side): $3\lambda/2d$ Surface Irregularity (Peak to Valley): $\lambda/4d$ Surface Quality: 40-20 Scratch-Dig Thickness Tolerance: $\pm 0.1$ mm Diameter Tolerance: +0.0 / -0.1 mm Centration: <3 arcmin Damage Threshold: 7.5 J/cm <sup>2</sup> (810 nm, 10 ns, 10 Hz, Ø0.144 mm) Abbe Number, $v_d = 64.17$ Clear Aperture: >90% of Diameter Focal Length Tolerance: $\pm 1\%$	10
31	Plano-Convex Lens, f = 75 mm	Material: N-BK7 Diameter: 1" Focal Length: 75 mm AR-Coated for 650 - 1050 nm range Radius of Curvature: 38.6 mm Reflectance over Coating Range (Avg.) @ 0° AOI: <0.5% Surface Flatness (Plano Side): $\lambda/2d$ Spherical Surface Power (Convex Side): $3\lambda/2d$ Surface Irregularity (Peak to Valley): $\lambda/4d$ Surface Quality: 40-20 Scratch-Dig Thickness Tolerance: $\pm 0.1$ mm Diameter Tolerance: +0.0 / -0.1 mm Centration: <3 arcmin Damage Threshold: 7.5 J/cm <sup>2</sup> (810 nm, 10 ns, 10 Hz, Ø0.144 mm) Abbe Number, $v_d = 64.17$ Clear Aperture: >90% of Diameter Focal Length Tolerance: $\pm 1\%$	5
32	Reflective ND Filter Kits	Box with 10 reflective ND filters Diameter: 25 mm SM1 mounted Wavelength: 200 nm – 1200 nm	2

**Further requirements:**

1. The optical components from item nos. 1, 6 till 13 and 32 must be compatible with high power femtosecond lasers.
2. Any typographical error will lead to technical disqualification and will not be entertained for clarification.



3. All components must be quoted and all specifications must be mentioned against the quoted part numbers.
4. Preferable make is ThorLabs and/or Edmund optics.