Program of requirements

In this program of requirements, ARCNL's requirements for the laser system, pricing and services are listed.

Requirements for the laser system

General requirements	
General requirements	
1.	The responsible management and the staff charged with carrying out the assignment shall have a sufficient command of the Dutch or English language, both spoken and written, to the extent relevant to the performance of the present work and any contractual obligations.
2.	No information that becomes available within the framework of this assignment will be made available to third parties from your company, with the exception of partners, subcontractors and/or auxiliary persons to be engaged by your company for the project at hand; in such a case, Tenderer will remain responsible for the confidentiality of those partners, subcontractors and/or auxiliary persons to be engaged.
3.	Your quotation will have a standing period of at least 180 days. During this period, your quotation has the character of an irrevocable offer.
4.	Tenderer agrees to extend the standstill period of your quotation, in the event of summary proceedings being initiated, to at least two weeks from the date of the decision in the summary proceedings.
5.	All information submitted by your company has been completed truthfully and can be stood by Tenderer. The Contracting Authority reserves the right to compensation in case of incorrect and/or incomplete information and/or inability to fulfil what has been offered by a tenderer.
Communication, consultation and reporting requirements	
6.	If there are any changes in the name or address details of your company or the contact persons for the Contracting Authority, please notify the Contracting Authority's contract manager immediately.
7.	Your registration contains the names of the persons acting as central contact person and their deputy. These persons are employed by your organisation, they have sufficient knowledge of the Dutch or English language in word and writing and relevant work experience.
8.	Tenderer shall have a complaints procedure related to the service to be provided.
9.	Receipt of queries and complaints will be acknowledged in writing within three working days.
10.	Questions and complaints will be answered in writing within five working days.
11.	The initiative to schedule (evaluation) interviews lies with the Contractor. The Contractor must also take care of the reporting and submit it to the Principal for approval within five working days.
Legal requirements	
12.	Tenderer fully and unconditionally conforms to the attached General Conditions of Purchase ARIV-2018. This means that only the terms and conditions used by the Contracting Authority will apply. Your quotation will not refer (in part) to other legal terms and conditions, even if these would not contradict the Contracting Authority's terms and conditions.

13.	Tenderer fully and unconditionally conforms to the attached (draft) agreement.
14.	If Tenderer claims to be the (main) contractor and Tenderer specifies (a) particular subcontractor(s) in your tender, Tenderer will be bound, when awarded, to actually use said subcontractor(s) in accordance with what is stated in the tender.
15.	Subcontracting work is allowed only if the Contracting Authority has given Tenderer written consent.
16.	As the main contractor, Tenderer bears full responsibility for the activities of your subcontractors. Tenderer handles communication on behalf of and to the subcontractor.
17.	Invoicing of subcontracted work will be handled by the main contractor.
Billing requirements	
18.	An invoice should contain at least the following information: • Invoice date • Level of compensation • Delivery dates • Order number • Description of all Products/Services provided, if necessary specified in a separate annex • Total invoice amount (excluding and including VAT) • Contract number • Work order number/Purchase number
Commercial requirements	
19.	All prices are submitted in Euro excluding VAT.
20.	The total amount of your tender is fixed and includes all costs, such as and insofar as applicable, but not exhaustive: execution, aftercare, overhead, travel and other costs.
21.	The prices quoted by Tenderer cover all the requirements set out in the Tender Document. This means that no additional costs will be charged by Tenderer.
22.	Additional work can only be carried out upon request and written consent of Contracting Authority.
Service requirements	
23.	Requested warranty of three years on seed laser and one year on rest of system.
24.	Installation, and measurement of beam power, beam mode, spatial beam profile, pulse width (with FROG or Spider), spectral profile and bandwidth, beam power stability and pointing stability confirming quoted specifications. Please refer to the site acceptance test (SAT) for further details.
25.	Basic user-training that includes training on basic maintenance of the laser system, during installation.
26.	Up to two follow-up user-training or troubleshooting visits within 12 months after installation. A follow-up training should be useful, e.g.: • Address new questions from the laser user - after having gained some experience with the system. • Basic user training for new/different laser users

Technical requirements

General	
27.	Femtosecond laser, >7 mJ, 1kHz, 35 fs for pumping a TOPAS HE (accepting up to 8mJ/35fs). **The supplied laser system is the first stage of a three-stage experimental set-up, with the capability of the seed laser to support**

	an additional amplifier of the same make generating another >7mJ, 1kHz, 35 fs beam on upgrade, without any change to the provided seed laser. The laser pulses would be used for high-harmonic generation. The high-harmonics would be used for metrology of nanoscale structures, as a result high-beam stability is crucial. For different experiments the output of the amplified Ti:sapphire laser will be used directly for the optical excitation and probing of carrier dynamics in liquids/solids. For the intended ultrafast nanoscale metrology applications, the laser system must deliver highly reproducible illumination conditions over extended acquisition times. The structures **we aim to image are <100 nm, and the operational timescale will be over several days**. As a result, the long-term stability of the beam quantified by **the power stability, excellent beam pointing stability, low beam quality factor M^2, active compressor stabilization, robust operation over realistic laboratory temperature variations, and dedicated thermal stabilization of the Ti:Sapphire crystal, becomes mandatory requirements for this specific laser system delivering pulses with energy >7mJ, pulsewidth 35 fs, and at a repetition rate of 1 kHz, with the option of in-lab upgrade as stated in paragraph 1.** These parameters are critical because small fluctuations in pulse energy, pointing, beam mode, pulse duration, or thermal lensing can shift the focal spot, alter the nonlinear conversion efficiency, move the HHG source position, and compromise long-term measurement reproducibility. Therefore, stability-related parameters is weighed strongly alongside nominal pulse energy when evaluating the suitability of the system for long-duration nanoscale metrology experiments. **The other important criterium is the nanosecond (ns) pulse contrast, which is the main pulse to pre-pulse ratio. A ns pulse contrast (main: pre-pulse) of lower than 2000:1 is required to ensure that the nanostructures are not destroyed before the main laser pulse arrives.** At the specified operational laser energy, pulsewidth and repetition rate, the best laser beam stability and pre-pulse contrast parameters namely: • <4 µrad (rms) beam pointing stability • <0.4% rms over 24 hours energy stability • TEM00 (M2 <1.20, both axes) beam quality • Active stabilization of the pulse compression (no 'breathing' of the pulse compressor) • Temperature stabilization of thermal lens (Ti:Sa crystal is Peltier cooled to -10°C) • Guaranteed maximize performance over a +/5 degree C temperature range • Nanosecond pre-pulse contrast better than 2000:1 (Main pulse to pre-pulse ratio) Are provided by the 2026 released Newport Spectraphysics Solistice APX laser system, within the specified price range, with additional laser design dedicated to ensuring minimum spectral distortion of the laser beam: • 4 enclosed sub-systems inside the amplifier housing (min. thermal disruption when opening the system) • Single Pockels Cell amplifier (minimal high-order dispersion) • End-pumped Ti:Sa amplifier crystal (low beam ellipticity and astigmatism) • No exit window after pulse compression (no spectral distortion)
Technical requirements (Mandatory)	
28.	Repetition rate: 1 kHz, option for future in-lab (at ARCNL) conversion to different pulse frequency (1-10 kHz)
29.	Pulse energy after compression: >7 mJ, measured during installation
30.	Central wavelength 800 ± 20 nm, measured during installation
31.	Spectral bandwidth: > 50 nm FWHM, measured during installation
32.	Pulse duration <35 fs, measured during installation. Option for future conversion to different pulse duration (anywhere between 35-100 fs).

33.	Active stabilization of pulse compression to prevent fluctuations of pulse properties (energy, pulse width) after compressor.
34.	Pulse energy noise: < 0.4 % rms over 1000 shots, measured during installation.
35.	Long-term pulse power stability: < 0.4% rms over 24 hours.
36.	Beam Pointing stability: < 4 µRad (rms) at constant room temperature, measured during installation.
37.	Main pulse to amplified spontaneous emission pre-pulse (ASE) background contrast in the nanosecond range: better than 2000:1 , evidence of which must be provided by manufacturer.
38.	Seed laser oscillator: Option for 50% output split off to power second amplifier of the same make to deliver another synchronous 7mJ, 1 kHz beam on upgrade (amplifier addition) without any changes to the original seed laser. Seed laser must be hermetically sealed.
39.	Two additional electronic triggers with sub-nanosecond jitter with respect to trigger for amplifier Pockels cell must be provided, giving adjustable delay from -30 µs to +10 µs
40.	Operating temperature Range of ±3°C or larger: Stable operation over laboratory temperature variations of at least ±5 °C without significant degradation of pulse energy, pointing stability, beam quality, or pulse duration.
41.	Beam quality: TEM00, M^2 < 1.20, both axes, linear polarization, measured during installation.
42.	Dedicated thermo-electric cooling of the Ti:Sa crystal. This is required to stabilize the thermal lens formed under high pump power. Since the amplifier cavity is optimized around a specific thermal lens, crystal-temperature fluctuations can cause cavity mismatch, degraded beam quality, pointing drift, and reduced pulse-energy stability. Active thermal stabilization therefore improves long-term mode stability and reproducibility, which are essential for multi-day nanoscale metrology experiments.
43.	Separately enclosed sub-systems inside the amplifier housing to minimize thermal drifts and disruption when opening the system.
44.	User-accessible stretcher/compressor for routine inspection, maintenance, and replacement of selected optics, where permitted under warranty and with appropriate training.
45.	The offer must include guaranteed compatibility with TOPAS HE (accepting up to 8mJ/35fs) and seed laser compatibility (having 50% output split off option) to support in-lab A(at ARCNL) installation of additional amplifier to generate another >7mJ, 35 fs beamline, without any change to the seed laser, synchronous with the existing amplifier output. Variable beam splitting (with motorized beam splitter) option for additional uncompressed output.
46.	Fast photodetector measuring oscillator pulse train with output to BNC or SMA-type connector
47.	Outputs for spectrometer fibers to measure, oscillator and amplifier spectral profile.
48.	Safety measures to avoid internal damage to the system itself due to laser instability and/or electronic (triggering) failure.
Technical and delivery requirements: Preference/more points would be awarded to tenders within the price limits with the following specifications	
49.	Broader pulse width tuning ranges would gain more points beyond (35-100fs)
50.	Beam Pointing stability: < 4 µRad (rms) at constant room temperature, measured during installation. More points would be awarded for better stability indicated by lower values of rms
51.	Pulse energy noise: < 0.4 % rms over 1000 shots, measured during installation. Better rms stability would be awarded more points.
52.	Beam quality: TEM00, M^2 < 1.2, both axes, linear polarization, measured during installation. Lower M^2 values will be awarded more points.
53.	Main pulse to amplified spontaneous emission pre-pulse (ASE) background contrast in the nanosecond range: better than 2000:1 , evidence of which must be provided by manufacturer. Better contrast will be awarded more points
54.	Shorter estimated delivery times would be awarded considerably more points.