

Workstation	System: Laser Coherent Astrella	Prepared by: M. Lopes, D. Perrin Controlled by: A. Caviglia	
	Location: Ecole de Physique Lab 121	User : Signature :	Date :

Short description
Spectrometry measurements
Required training
<ul style="list-style-type: none"> • Training, safety, organization and general instructions • Chemistry and fire hazard training • Gas hazard training • Laser hazard training • Specific training in the use of the Coherent Astrella laser • Specific training in the use of the TOPAS TWINS laser

Coherent Astrella



Laser class 4
Ray invisible
Wavelength
780-900nm

TOPAS TWINS



Laser class 4
Ray. Invisible
Wavelength
1.1 – 2.8 µm

DFG





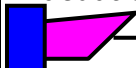











Laser class 4
Ray. invisible
Wavelength
4.5 – 15 µm

THz





Laser class 4
Ray. invisible
Wavelength
50 µm – 3 mm

Risks		Personal protective equipment
<ul style="list-style-type: none"> • Hands 	<ul style="list-style-type: none"> ○ Thermal burns due to laser beam 	SEE BEST PRACTICES
<ul style="list-style-type: none"> • Eyes and face 	<ul style="list-style-type: none"> ○ Radiation Burn (Laser Beams) 	
<ul style="list-style-type: none"> • Body 	<ul style="list-style-type: none"> ○ Thermal burns due to laser beam 	
<ul style="list-style-type: none"> • Respiratory 	<ul style="list-style-type: none"> ○ Inhalation of toxic fumes 	SEE BEST PRACTICES

General Safety Rules	Best practices
<p>Evacuation of the building</p>  <p>Evacuation order by voice alarm</p>  <p>Physics School car park Meeting point</p>	<ol style="list-style-type: none"> 1. Cease operations 2. Leaving the building using emergency routes  <ol style="list-style-type: none"> 3. Reach the assembly point assigned to the area <p>Physics school parking lot</p>  <ol style="list-style-type: none"> 4. Wait for instructions at the assembly point
<p>Fire outbreak</p>   	<ol style="list-style-type: none"> 1. Contact the emergency services 118. 2. Fighting an incipient fire with the means of extinguishing it available
<p>In the event of accidental leakage of liquid, gas</p>  	<ol style="list-style-type: none"> 1. Contact the emergency services 1222 2. Evacuate the area
<p>In the event of splashing or contact with chemicals, thermal burns due to the laser</p> 	<ol style="list-style-type: none"> 1. Wash the contaminated area thoroughly (approx. 15 minutes) <p>Contact the emergency services 1222</p>
<p>Access Control</p> 	<ol style="list-style-type: none"> 1. Only personnel with the required training (safety and technical) have access to the equipment 2. Access to the room by key 3. 1 red flash at the entrance of the room informs of the operation of the laser 

Special risks	Best practices
<p>➤ Use of the <u>Laser</u></p>	<ul style="list-style-type: none"> - Lasers may be used only by persons who have been specifically authorized and who have completed the required training (technical and safety) <ul style="list-style-type: none"> - Before using the laser, the staff has received <u>specific training in the use of the equipment</u> and has carefully read the Laser User Manual
<p>➤ <u>Non-functioning security systems</u></p>	<ul style="list-style-type: none"> - Learn about the location and actions of the components, safety device (e.g. activation key, mechanical protection, etc.) <div> </div> <ul style="list-style-type: none"> - Immediately report any anomalies to the laboratory manager and the laser safety manager - Periodically, check the safety devices (emergency stops, interlocks) - Respect the signals in place


Special risks	Best practices
<p>➤ <u>Risk of burns to the skin or eyes</u></p> 	<p>In the event of laser malfunction, laser injury:</p> <ol style="list-style-type: none"> 1. Turn the key off, turn off the power supply (on/off switch) or activate the emergency stop  <ol style="list-style-type: none"> 2. Alert the emergency services (Tel.1222/118) 3. Evacuate the room 4. Prohibit access to other persons 5. Inform the Laser Safety Manager 6. Before to return to normal operation of the installation <ul style="list-style-type: none"> • Wait for the approval of the technical service / fire brigade
<p>➤ <u>Lone worker (weekend – evening)</u></p>	<p>Lone work prohibited. Work carried out by min. 2 people. Maintain visual and vocal contact</p>

Special risks	Best practices
<p>➤ <u>Risk of burns to the skin or eyes</u></p>	<p><u>General Safety Rules</u></p> <ul style="list-style-type: none"> - Only people trained and authorized by the UniGe can use class 4 lasers. - A laser safety officer is responsible for the following tasks: <ul style="list-style-type: none"> • Understand laser hazards, as well as all important aspects of laser safety • Be aware of laser radiation protection devices, install them as necessary and regularly check that they are working properly. - Never position hands in the pulsed laser beam - Avoid wearing shiny jewellery (rings...) on your hands (risk of focusing of scattered radiation) - Do not open the protective cover while the appliance is in operation. - Never attempt to repair the appliance

**Use of Class 4 Laser
(General Safety Rules)**



- yourself. Contact the laser supplier
- Never look into the path of the laser beam even with safety glasses on.
- Pay attention to possible reflections of the laser beam on reflective surfaces!
- Do not intentionally direct the laser beam at people
- Only trained persons equipped with laser-specific safety glasses are allowed to work in the controlled laser area
- Ensure that there are no objects in the beam path that could cause uncontrolled reflection or scattering of the laser beam
- Wear safety glasses specific to the wavelengths of lasers and protective clothing covering the body parts that may be in contact with the laser beam

Special risks	Best practices
<p>➤ <u>Risk of burns to the skin or eyes</u></p> <p>Additional safety guidelines for planning experiments</p> <p>Use of Class 4 Laser</p> 	<ul style="list-style-type: none"> - The layout of the experiment that uses the laser must be <u>discussed and validated by the laboratory manager and the professor in charge</u> - Instructions to be followed; <ul style="list-style-type: none"> - Containment of the beam path : If operators are to be present in the room during the beam transmission, the optical path must be contained. (Installation of mechanical protection) - Make sure all optics are securely attached. Do not scotch-tape to fix the optics as they may fall off. Use optical mounts attached to the optical table with screws - Avoidance of reflections from the primary beam to the operator. The presence of reflective objects in the room (e.g. metallic plates, and jewellery) should be avoided. Provide for the use of mechanical protection to prevent unwanted reflections <ul style="list-style-type: none"> - The plane in which the beam



travels should be lower than eye level when sitting, unless the setup is completely shielded

- Lasers should not be used near the entrance door of the laboratory, installation of protective curtains, screen to confine the assembly area and protect other people working in the laboratory
- Dispose of and report any defective pairs of glasses (scratched or damaged filters)
- Provide extra glasses for visitors

Special risks

Best practices

- Risk of burns to the skin or eyes

Additional safety instructions for the preparation of the experiment

Primary beam reflections during laser alignment

Use of Class 4 Laser



Additional safety instructions




- It is forbidden to power up the laser when the optics are not secured by blocking them
- The operator must be in full compliance with the instructions defined in the laser user manual
- Activities should be performed with the lights in the room on to reduce the dilation of users' pupils


Special risks


Best practices




Additional safety instructions


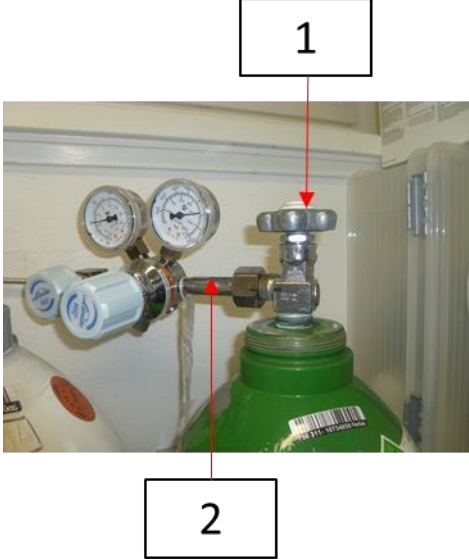

- Validation by the laboratory manager for any adjustments to the laser beam or mechanical protections
- The laser in operation is under the permanent supervision of a person trained and authorized for the use of the laser
- Wearing headphones is forbidden in order to remain vigilant in the event of a malfunction of the laser


<p>➤ <u>Risk of burns to the skin or eyes</u></p> <p>Additional safety instructions related to the conduct of experiments</p> <p>Use of Class 4 Laser</p>  	<p>and the needs of employees working in the same room</p>  <ul style="list-style-type: none"> - In the event of a laser anomaly, immediately inform the laser manager or the professor in charge of the laboratory - In the event of an accident, apply the UniGe instruction <ul style="list-style-type: none"> - Call 1222 or 022379 1222 and inform the laboratory manager - If the light in the room must be turned off <ul style="list-style-type: none"> - Ask for the agreement of your colleagues who work nearby - Check the workspace for obstacles to prevent falls on the same level
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Special risks	Best practices
<p>➤ <u>Risk of burns to the skin or eyes</u></p> <p>Class 4 Laser Maintenance and Repair</p> 	<ul style="list-style-type: none"> - Repairs and maintenance of the laser must only be carried out by the supplier (trained and approved personnel) - Carry out maintenance work according to the schedule set out in the operating instructions (see details in the operating instructions for work equipment)


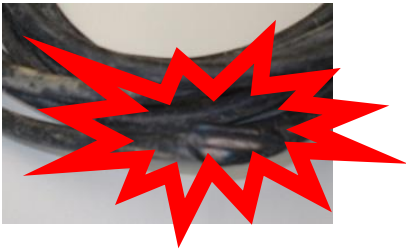
Special risks	Best practices
<p>➤ <u>Risk of impact, falling objects, projection, contamination</u></p>  <p>Gas cylinder storage</p>	<ul style="list-style-type: none"> - Attach the gas cylinders vertically with a strap - Unconnected gas cylinders must be fitted with their protective cap - Never open valves abruptly or with a tool - Unused gas lines must be sealed tightly to prevent any type of leakage (e.g. cap or plugs)

Special risks	Best practices
<p>□ <u>Risk of falling objects, throwing objects, gas</u></p>  <p>Gas cylinder handling</p>	<ol style="list-style-type: none"> 1. Systematically disassemble the pressure reducer before moving the gas cylinder 2. Screw the protective cap onto the cylinder 3. Strap the gas cylinder onto the transport trolley  <ol style="list-style-type: none"> 4. Do not accompany gas cylinders in freight elevators/elevators  <ol style="list-style-type: none"> 5. The person sends the gas cylinders through the elevator and asks a colleague to receive them on his floor. <p>No gas cylinders should be left in the elevator/freight elevator.</p>

Special risks	Best practices
<p>□ <u>Risk of shock, falling object, projection, self-ignition</u></p> <div>  </div>	<p>Gas cylinder replacement</p> <ol style="list-style-type: none"> 1. Close the cylinder valve 2. Disassemble the regulator using a key 3. Putting on the cap <div>  </div> <p>Commissioning of gas cylinders:</p> <p>Connection to the specific gas network (N₂, He)</p> <ol style="list-style-type: none"> 1. Tighten the fitting/pressure reducer 2. Check the tightness of the fitting with a suitable method (e.g. bubble tester) 3. Open fully the faucet, slowly and smoothly <p>✓ Neither oil nor grease the taps; Avoid contact of fats, oils, or combustible substances with oxygen</p> <div>  <p>Ne jamais utiliser ni huile, ni graisse pour lubrifier des équipements destinés au service oxygène!</p> </div> <p>✓ The storage of combustible or flammable material is prohibited in the vicinity of the oxygen storage</p>

Special risks	Best practices
<p>➤ <u>Fire risk</u></p> <p>Direct or reflected radiation from the laser beams</p> 	<ol style="list-style-type: none"> 1. Move combustible materials (e.g., paper, wood panels) away from the direct or reflected field of the laser 2. Store flammable liquids in a secure cabinet, away from the laser path 3. No containers containing highly flammable solvents should be in the work area <p>Do not wear clothing made of synthetic fibres (wear cotton materials)</p>

Risques particuliers	Bonnes pratiques
<p>➤ <u>Risk of co-activity with external companies</u></p>	<p>- The lab manager coordinates safety when external companies work in the laboratory.</p>

Special risks	Best practices
<p>➤ <u>Risk of untimely starting (Burning of the skin or eyes)</u></p> <p>Maintenance, repair</p>	<p>- Full compliance with the principles of safety of work equipment</p> <ol style="list-style-type: none"> 1. Identify the energies, fluids that power the work equipment 2. Isolate and separate 3. Purge and test insulation <p>For details on how to secure the equipment, refer to its user manual</p>
<p>☐ <u>Risks related to electric current</u></p>  	<ol style="list-style-type: none"> 1. Only work with equipment in good condition (undamaged electrical cable, etc.) 2. Intervention on electrical installations is forbidden to unauthorized persons 3. Immediately report any damage to equipment (electrical box, socket, etc.)

Risques particuliers	Bonnes pratiques
<ul style="list-style-type: none"> ➤ <u>Poisoning by contamination of food products</u> 	<p>It is forbidden to eat in laboratories.</p>

Risques particuliers	Bonnes pratiques
<ul style="list-style-type: none"> ➤ <u>Electromagnetic radiation generated by a pump or transformer</u> 	<p>Inform wearers of pacemakers or metal prostheses to stay at a safe distance of at least 20cm from the source of the radiation.</p>

Appendix 1: Laser Class

Category	Organizational measures	Technical measures
1	-	
2	-	
3A	<p>Do not use at eye level</p> <p>Notify other lab users</p> <p>Prevent unauthorized use</p>	<p>Red flags</p> <p>No reflective objects near the laser</p> <p>Minimize the length and possible directions of the radius</p>
3B and 4	<p>Use is only permitted in a controlled area (door automatically closing and "laser on" sign on the display panel)</p> <p>The laser can only be used when users are wearing the appropriate protective equipment and when unauthorized entry is prohibited</p>	<p>Unwanted rays must not reach anyone</p> <p>Protective eyewear mandatory</p>

Revision history

Date	Nature of Change	Reason for change
31.07.2025	Mise en page Ajout utilisateurs	Emplacement signature