

Laser Safety Instructions (LSU)

§1 Validity

Valid for the **Department of Mineralogy and Crystallography (IfMK)** at the Faculty of Earth Sciences, Geography and Astronomy (FGGA) of the University of Vienna, in addition to the general laboratory and workshop regulations of the University of Vienna and with respect to laboratory safety instructions (ASLS) of the IfMK in the respective current version.

§2 Legal Basis

In the respective current versions:

Verordnung optische Strahlung (VOPST)

§66 Arbeitsschutzgesetz (ASchG)

§66,70,71 Allgemeine Arbeitnehmerschutzverordnung (AAV)

§3 Downloads

(www.univie.ac.at/Mineralogie Research Safety regulations [Laser protection])

http://www.univie.ac.at/Mineralogie/docs/IfMK_Unterweisung_LSU_d.pdf

(www.univie.ac.at/Mineralogie Research Safety regulations)

http://www.univie.ac.at/Mineralogie/docs/IfMK_Unterweisung_ASLS_e.pdf

Allgemeine Labor- und Werkstättenordnung der Universität Wien

http://anchem.univie.ac.at/fileadmin/user_upload/i_anchem/Laborordnung_Mitteilungsblatt.pdf

§4 Contact Persons

Function	Name	Room	Phone number
Laser Safety Officer	Christian Lengauer	2B348	+43 1 4277 53243 +43 60277 53243 (M)
Safety Officer	Wolfgang Zirbs	2A244	+43 1 4277 53277
Devices in charge	Lutz Nasdala	2A251	+43 1 4277 53220
	Eugen Libowitzky	2B381	+43 1 4277 53250
	Martin Ende	2B244	+43 1 4277 53244

Complete informations on the current laboratory managers (= Laborbereichsleiter) and persons in charge of laboratories (= Laborverantwortliche), instrument operators (= Geräteverantwortliche) and official IfMK safety representatives (= IfMK Beauftragte) can be found on:

http://www.univie.ac.at/Mineralogie/docs/IfMK_Laborverantwortliche.pdf

http://www.univie.ac.at/Mineralogie/docs/IfMK_Geraeteverantwortliche.pdf

§5 Equipment directory

Lab	Equipment	Laser class	Operator
2A145	Horiba LabRam HR Evolution		Lutz Nasdala
	473 nm (VIS blue) < 100 mW	3B	
	532 nm (VIS green) < 130 mW	3B	
	633 nm (VIS red) < 30 mW	3B	
2B346	Horiba LabRam HR		Lutz Nasdala
	325 nm (UV-A) < 200 mW	3B	
	532 nm (VIS green) < 100 mW	3B	
	633 nm (VIS red) < 30 mW	3B	
	785 nm (IR-A) < 200 mW	3B	
	Renishaw		Eugen Libowitzky
	488+514 nm (VIS blue+green) < 200 mW	3B	
	633 nm (VIS red) < 50 mW	3B	
	780 nm (IR-A) < 50 mW	3B	
2A176	Laser-heating		Martin Ende
	473 nm (VIS blue) < 50 mW	3B	
	1070 nm (IR-A) < 100 W	4	

§6 General instructions

The relevant IfMK laser facilities at the Geocentre, UZA-2, include microscopy systems for Raman spectroscopy with almost closed, static beam paths and a laser-heating device ~~for diamond-anvil cells~~ with an open, adjustable beam path (2A176).

In accordance with applicable legal frameworks the laser devices for Raman spectroscopy in the laboratories 2A145 and 2B346 are classified as class 3B, the laser-heating device in laboratory 2A176 as class 4.

Laser class 3B

- Power: 5- 500 mW for all wavelengths
- Direct beam: dangerous for eyesight, only in rare cases for the skin
- Diffuse reflections: harmless (if distances > 150 mm, exposure < 10 sec)
- Protective measures: technical, organisational, personal (i.e. eye protection)

Laser class 4

- Power: > 500 mW for all wavelengths
- Direct beam: dangerous for eyesight and skin
- Diffuse reflections: dangerous for eyesight and skin
- Protective measures: technical, organisational, personal (i.e. eye and skin protection)

The compliance of instructions related to laser-safety issues and monitoring of related IfMK laboratory safety measures is in the responsibility of the laboratory managers, in case of supervisory relationships supervisor and project leaders are responsible. In general all laser devices can only be used after having received proper instructions through authorized personnel or the instrument operators.

For unattended persons downwards 18 years of age and persons unaffiliated with the institute, it is forbidden to enter any laboratory with laser equipment.

The unsupervised use of equipment with laser devices requires the approval in advance through the supervisor or the instrument operator. In cases of doubt with respect to laser safety and protection it is mandatory ~~either~~ to read the operation manual and/or instruction handbook, or to contact the supervisor, or the instrument operator.

Most accidents occur during special-mode operations of a laser device. Accordingly, any work related to maintenance, repair, or reconstruction of the device must be undertaken exclusively through qualified persons and service engineers. These activities must be recorded in the log book. Any activity with a risk for exposure to eyes or skin, must be carried out by using laser-safety goggles and protective clothing without exception. It is strictly forbidden to remove or modify any beam shields of the devices.

§7 Laser exposure to eyes

Spektralgebiet	Wellenlängenbereich	Schädigungsursache	Krankheitsbild
UV-C	(100)180-280	Absorption in der Hornhaut und der Bindehaut	Erzeugung einer Photokeratitis (Entzündung der Hornhaut des Auges), Entstehung einer Photokunjunktivitis (Entzündung der Bindehaut des Auges)
UV-B	280-315	Absorption in der Hornhaut und der Linse	Erzeugung einer Photokeratitis (Entzündung der Hornhaut des Auges), Entstehung einer Katarakt (grauer Star) in der Linse
UV-A	315-380	Absorption in der Linse	Entstehung einer Katarakt (grauer Star) in der Linse
Vis	380-780	Absorption in der Netzhaut	Thermische Zerstörung der Netzhaut, Blaulicht-Gefährdung
IR-A	780-1400	Absorption in der Netzhaut, Absorption in der vorderen Augenkammer	Thermische Zerstörung der Netzhaut, Eintrübung der vorderen Augenkammer
IR-B, IR-C	1400-1x10 ⁶	Absorption in der Bindehaut und Hornhaut	Thermische Zerstörung der Bindehaut und Hornhaut

§8 Laser exposure to skin

Spektralgebiet	Wellenlängenbereich	Krankheitsbild
UV-C	(100)180-280	Erythembildung (Hautrötung) mit sekundärer Pigmentierung, Carcinogenese (Hautkrebs)
UV-B	280-315	Erythembildung (Hautrötung) mit sekundärer Pigmentierung, Carcinogenese (Hautkrebs)
UV-A	315-380	Sofortpigmentierung ohne Erythembildung
Vis	380-780	Thermische Zerstörung der Haut, Verbrennungen
IR-A	780-1400	Thermische Zerstörung der Haut, Verbrennungen
IR-B	1400-3000	Thermische Zerstörung der Haut, Verbrennungen

§9 Instructions in emergency cases

In case of a safety-relevant event the user is committed to inform immediately the laser safety officer and the instrument operator. In case of uncertainties the measuring modes and the operation must be stopped and the laser device must be shut down in a controlled manner according to the operating manual.

In case of a safety-relevant emergency event the power supply for the laser device must be break by pushing the emergency button at the instrument (or at the laboratory bench), and the laboratory itself must be left. After heaving left the laboratory the user is committed immediately to inform the laser safety officer and the instrument operator.

§10 Instructions for operation mode

- (1) The operation mode of a laser-device must be indicated during the measurement period
 - (i) by activating the red signal lamp above the laboratory entrances, and
 - (ii) by using appropriate warning signs and boards attached to the laboratory entrances.
- (2) All operation activities, which might cause directed reflections through the sample in the beam path, require the mandatory use of laser-safety goggles. The use of gloves is recommended in order to protect hand and fingers.
- (3) Personal items with reflecting (~~metal~~) surfaces, i.e. rings, watches, bracelets, chains must be removed or require the use of lightproof gloves and protective clothes.
- (4) For ~~the~~ operation of the UV-A laser (class 3B) in lab 2B346 it is necessary to check the function of the room ventilation before getting into operation mode. During the operation of the laser it is mandatory to wear gloves, long sleeve clothes, and the laser-safety goggles (LaserVision P1012).
- (5) The operation of the IR-A laser (class 4) in 2A176 requires special attention. In advance of starting the operation mode, the whole working area must be checked for possible reflections. It is mandatory to wear the appropriate laser-safety goggle (LaserVision T1KO3) and clothes, which cover the skin.

Wien, 31. August 2017

Laser Safety Officer

Christian L. Lengauer e.h.

Safety Officer

Wolfgang Zirbs e.h.