

To the Qualified Experts under the Nuclear Safety and Radiation Protection of the University of Ferrara

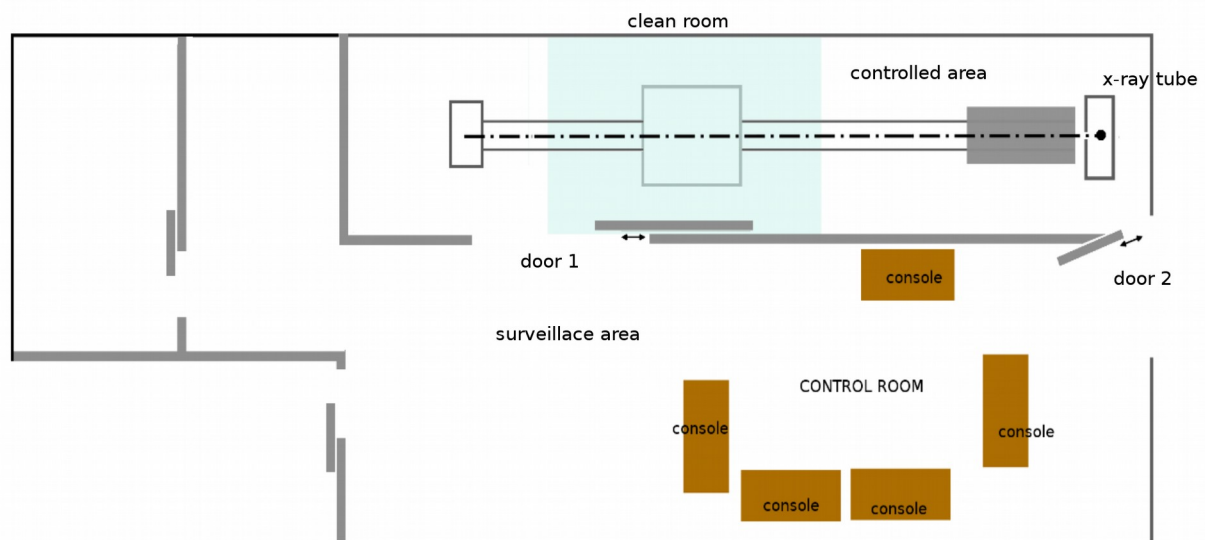
Basic X-ray training for using the LARIX facility of the Physics and Earth Science Department.

The LARIX laboratory is a facility for astrophysical application, calibration of detectors and crystallography. As part of this capability it uses a powerful beam of X-rays. The Italian law as well as common sense, require that individuals using such facilities receive a proper training in their safe use.

The laboratory consists of two main areas: the LARIX A and the LARIX TUNNEL.

The LARIX A Laboratory is subdivided in different areas:

- A - The clean room;
- B - The X-ray tube and monochromator room;
- C - The control room;
- D – The liquid Nitrogen deposit.



Areas A and B are involved by the X-ray beam and the access is forbidden when the X-ray beam is on. Areas A and B have separate entrance sliding doors which are separately provided of switch that interrupt the X-ray beam emission if open. Each operator is responsible for all the other colleagues and must assure that all of them are safe and outside the forbidden areas before to switch on the X-rays. Before to enter in the X-ray beam area it is mandatory to verify that all the warning lights indicated closed position for the beam.

The X-ray tube has a maximum voltage of 150 kV with a power of 1300 W. The tube is accommodated in a box whose partition are 2 cm thick on all the sides and 4 cm thick on the x-ray emission side. Before to use the x-ray tube, each working day it is required a “training” or “warm-up” that takes several minutes. Every day it must be performed the procedure to avoid x-ray beam problems during the run. It is forbidden to manage with the

X-ray tube high voltage machinery, modify any hardware or control software in the control room.

The clean room has a controlled temperature which is in the range 18-19.5 C. If the member of the calibration team need to enter in the clean room, shoes cover must be weared to preserve the room cleanliness. In the clean room is forbidden to run, to eat, to stay for longer time than required.

In the control room 3 consoles are used to set the position of the detectors, to switch the x-ray tube on and off, to set at the proper energy the x-ray beam of the monochromator system. The staff is instructed to use the devices but some member of the LARIX facility is always present to give help and verify any possible problems occurring in the x-ray beam-line during the calibration campaign.

The nitrogen tank is accomodated at 15 meters from the entrance of the LARIX tunnel. The area beyond the tanks is forbidden to the external people for security reasons. The staff must be equipped with safety glooves and safety glasses before to use and fill the detectors with the nitrogen.