INFN
Istituto Nazionale
di Fisica Nucleare

Laboratori Nazionali di Frascati

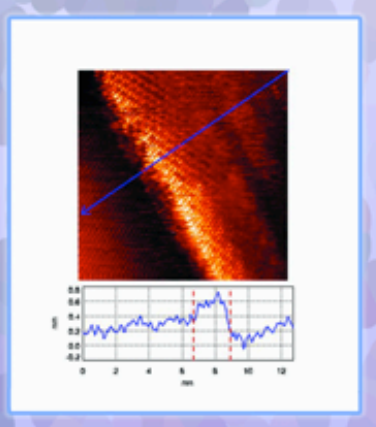
Science, Technology, and Society

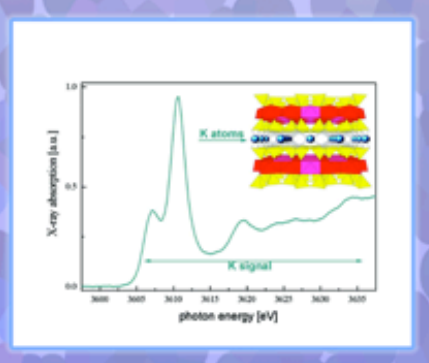
Scientific research at Frascati benefits society through educational programs, and through technological developments in the fields of detectors, accelerators, synchrotron radiation, and material science.

Educational initiatives at Frascati include programs for teachers and students from primary school to university levels. Other outreach initiatives include guided tours, training seminars, and internships.

Physicists, engineers, and technicians unite physics and technology in the development of advanced detectors for next-generetion experiments. The photo above shows the assembly of Monitor Drift Tubes, which are large detectors for charged particles that will cover an area of about 5000 m^2 in the ATLAS experiment at CERN.

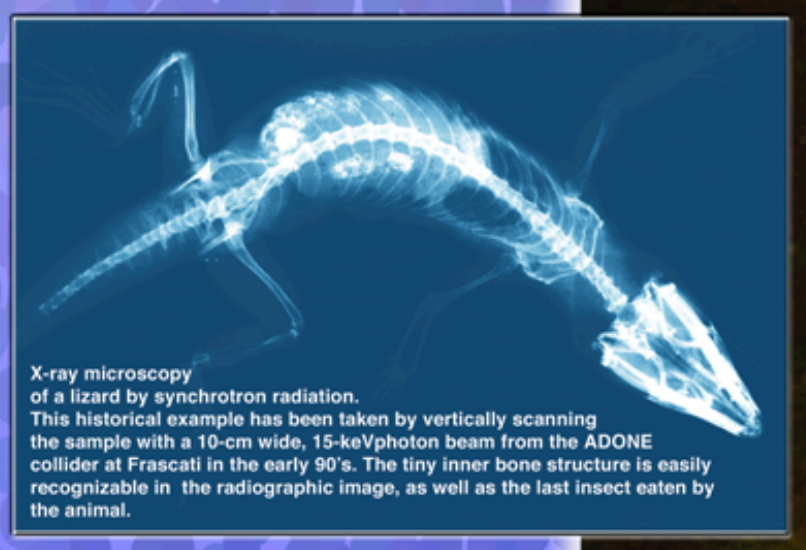
Nanotubes are chains of carbon atoms or other molecules, which form hollow cylinders with diameters from 1 to 300 nanometers. Mechanically, nanostructures are the strongest and stiffest materials known, and can be either electrical conductors or semiconductors. The figure shows a scanning-tunneling microscope image of a single nanotube grown at Frascati in a new, dedicated laboratory. Individual carbon atoms can be distinguished and account for the nanotube's grainy surface texture. Applications of nanotube technologies to material-science and accelerator research include the development of low-emission e^- guns and uses with synchrotron radiation.





X-ray absorption spectroscopy on a 40 μm mineral film at the DAΦNE X-ray beamline in Frascati. Synchrotron radiation is a unique tool for probing the local environment of materials. Here, potassium atoms in a multilayered granitic rock (mica) have been characterized inside the mineral structure shown in the inset picture.

The intense synchrotron radiation emitted from the bending magnet source at the DAΦNE electron ring using a current of 0.4 Ampere. The image, taken by a CCD camera, shows the visible light at the end of the infrared beamline, a pipe under ultra-high vacuum that is over 20 meters long and which encloses six gold coated mirrors.



X-ray microscopy
of a lizard by synchrotron radiation.
This historical example has been taken by vertically scanning the sample with a 10-cm wide, 15-keVphoton beam from the ADONE collider at Frascati in the early 90's. The tiny inner bone structure is easily recognizable in the radiographic image, as well as the last insect eaten by the animal.

Artwork by C. Federici

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