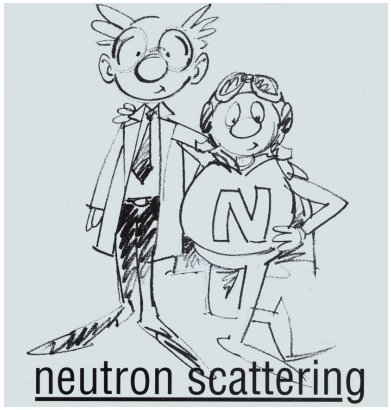
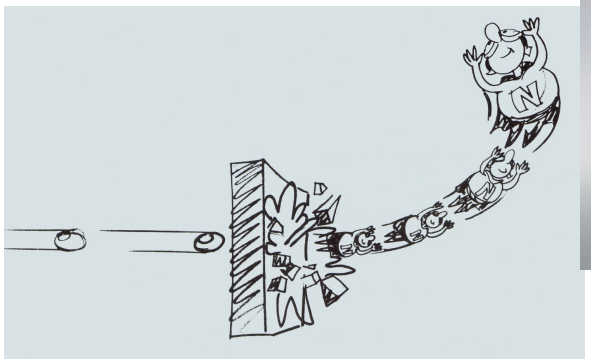


Neutron and Xray Scattering Facilities

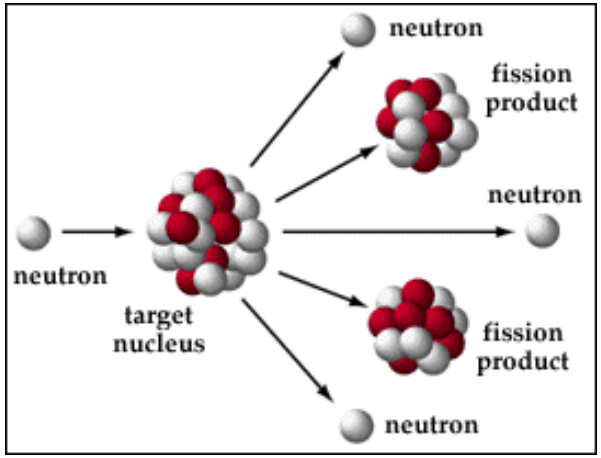
by

Roger Pynn
Indiana University and Oak Ridge National Lab

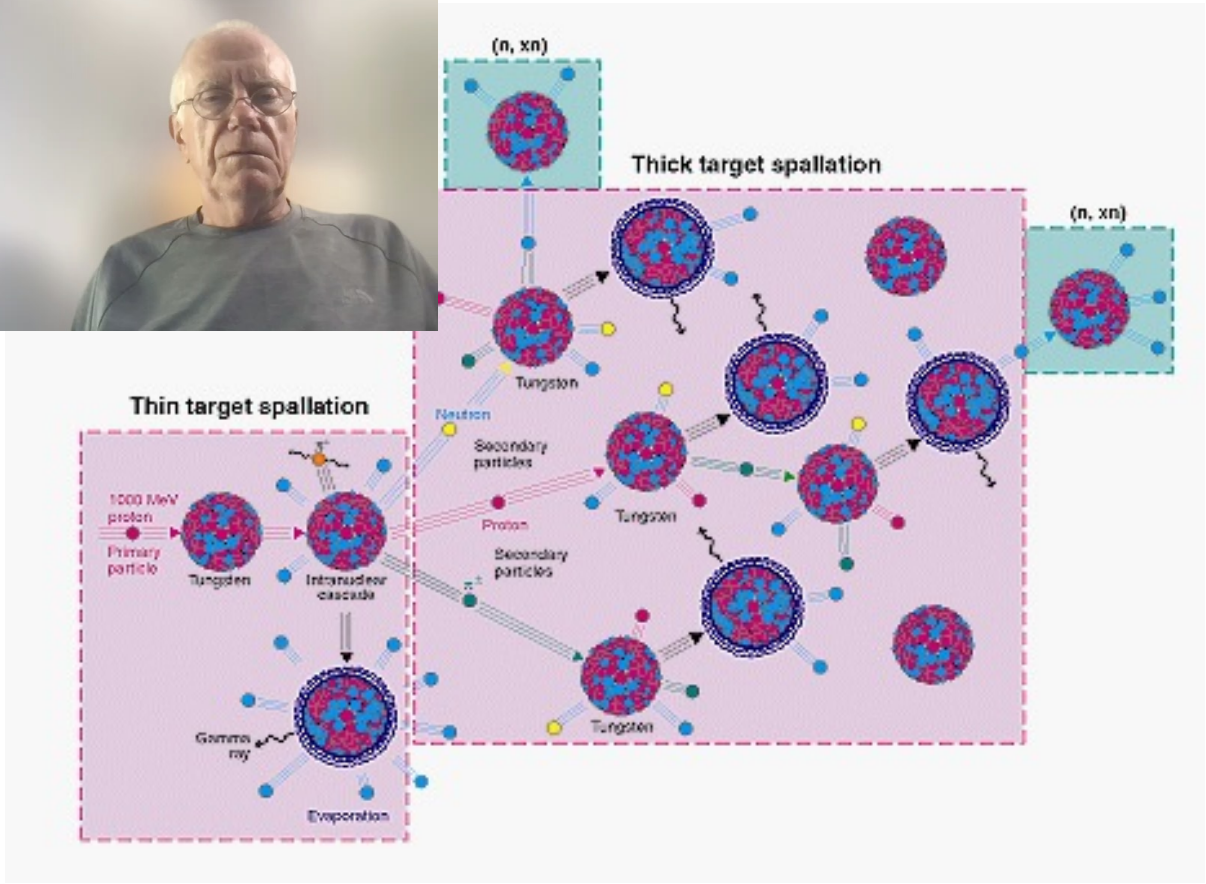
Nuclear Fission & Spallation are the Methods of Choice to Produce Neutrons for Scattering



Artist's view of spallation



Nuclear Fission



Spallation

Fission: ~200 MeV per useful neutron

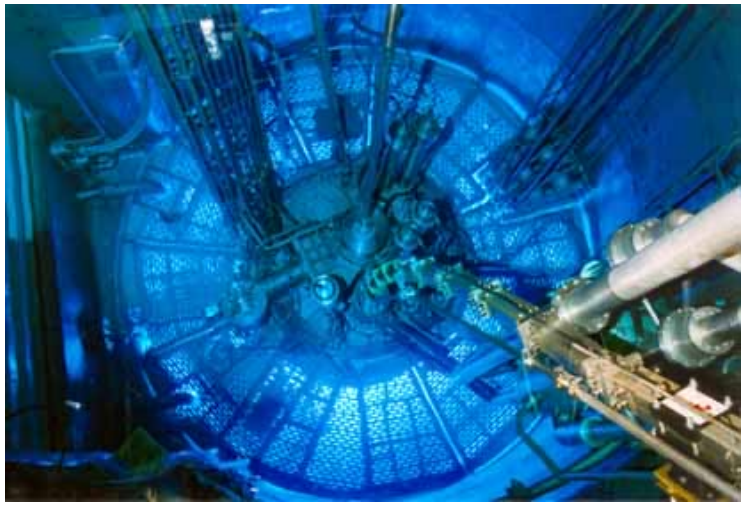
Spallation: ~20 MeV per useful neutron

The Institut Laue Langevin Reactor

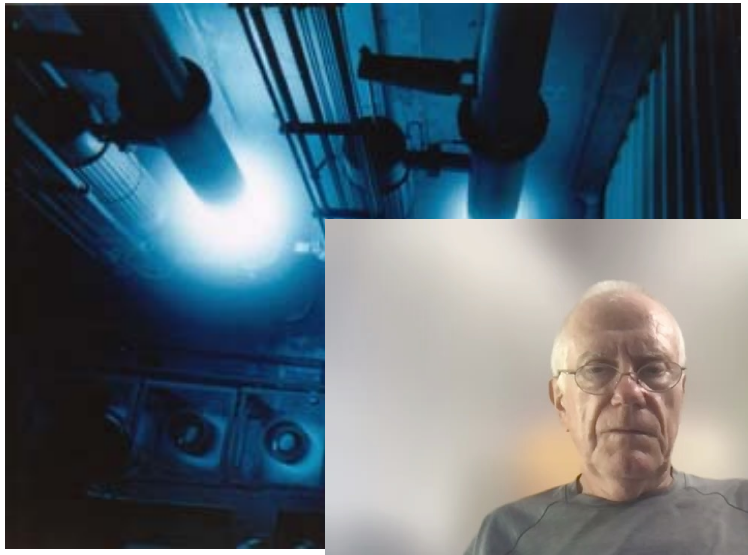
Cross section of reactor

1. Safety rod
2. Neutron guide pool
3. Reflector tank
4. Double neutron guide
5. Vertcial cold source
6. Reactor core
7. Horiz cold source
8. Control rod

Fuel element: top view

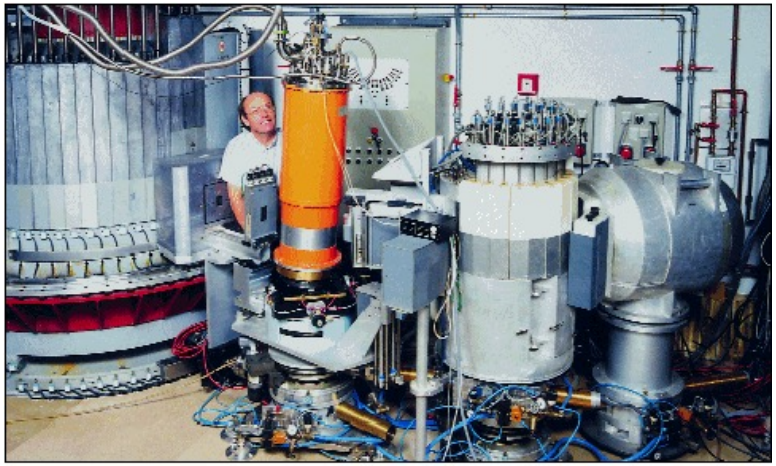


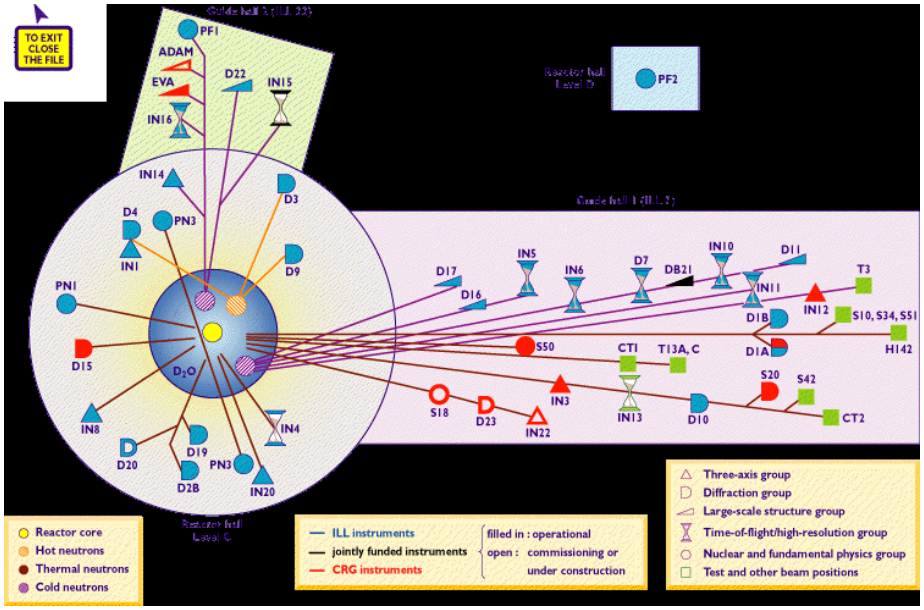
Reactor pool; light water

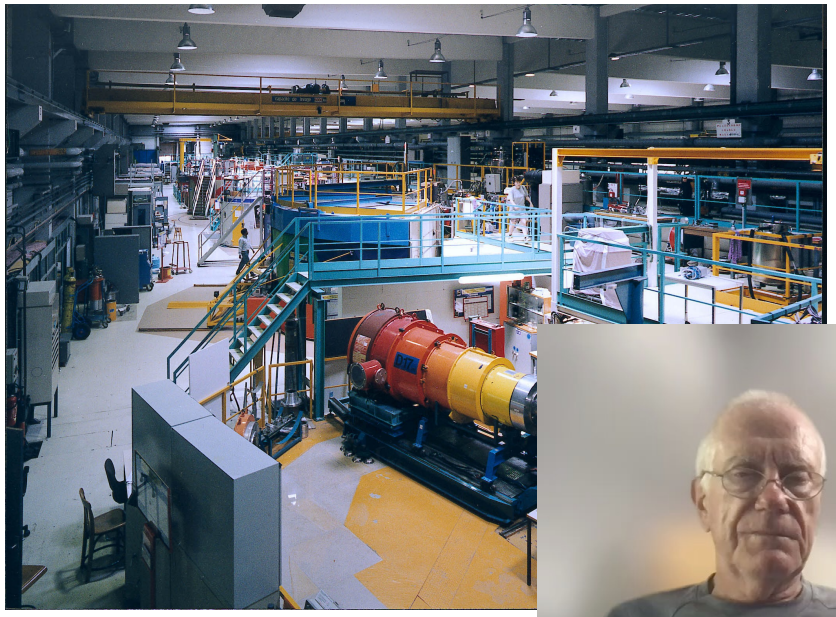


Spent fuel pool ⟶

Neutron Sources Provide Neutrons for Many Spectrometers e.g. at the Institut Laue-Langevin

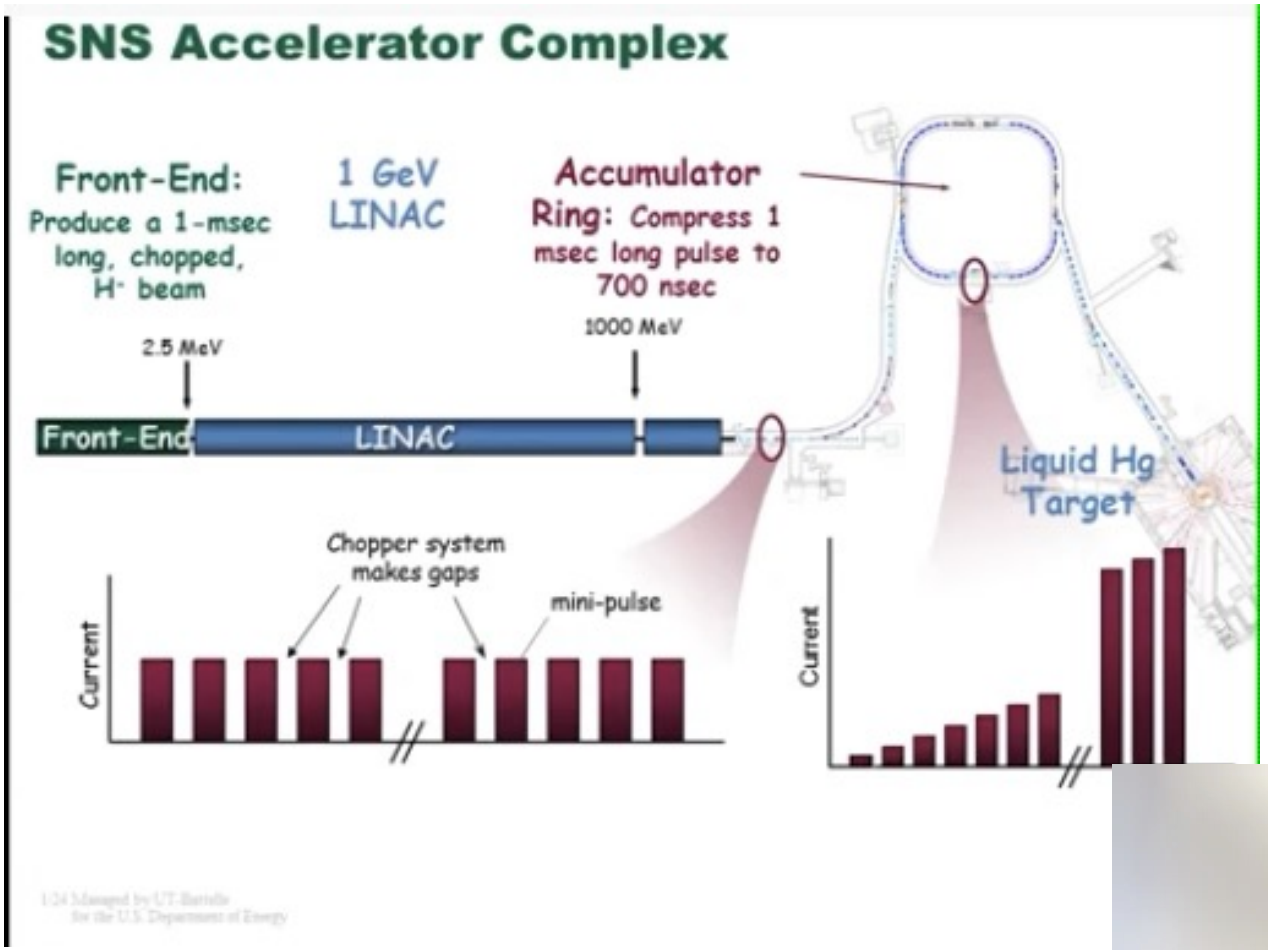






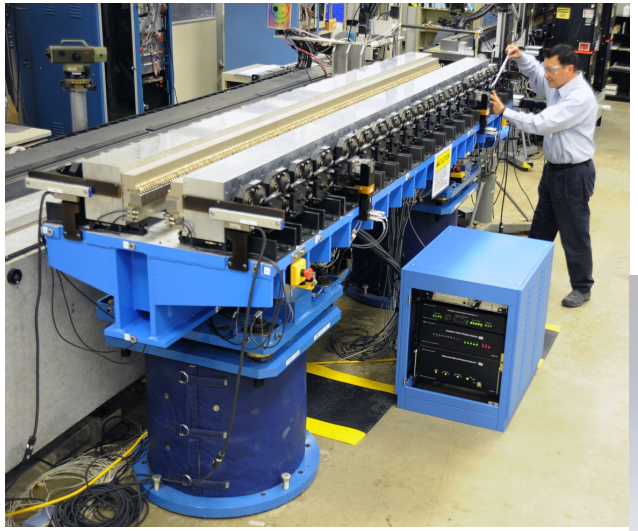
Guide hall: 20x30

Several modern neutron sources, including the SNS at ORNL, generate neutrons using the spallation process

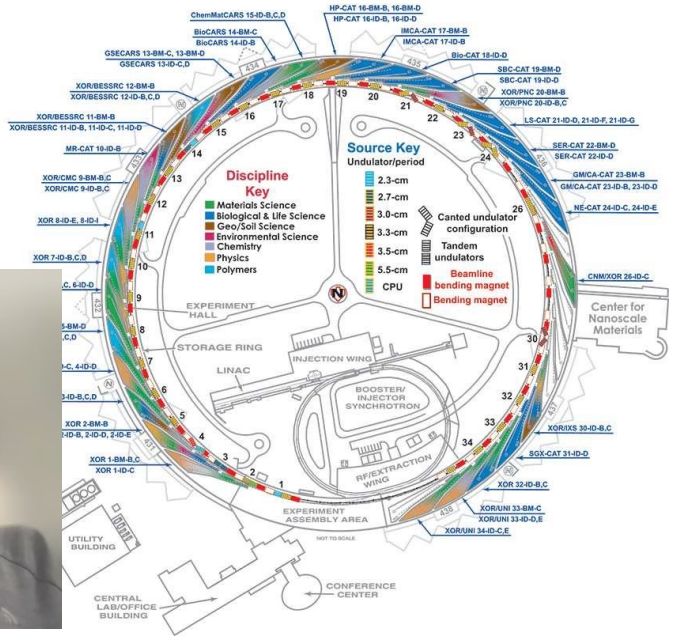


Synchrotron Radiation: the Advanced Photon Source

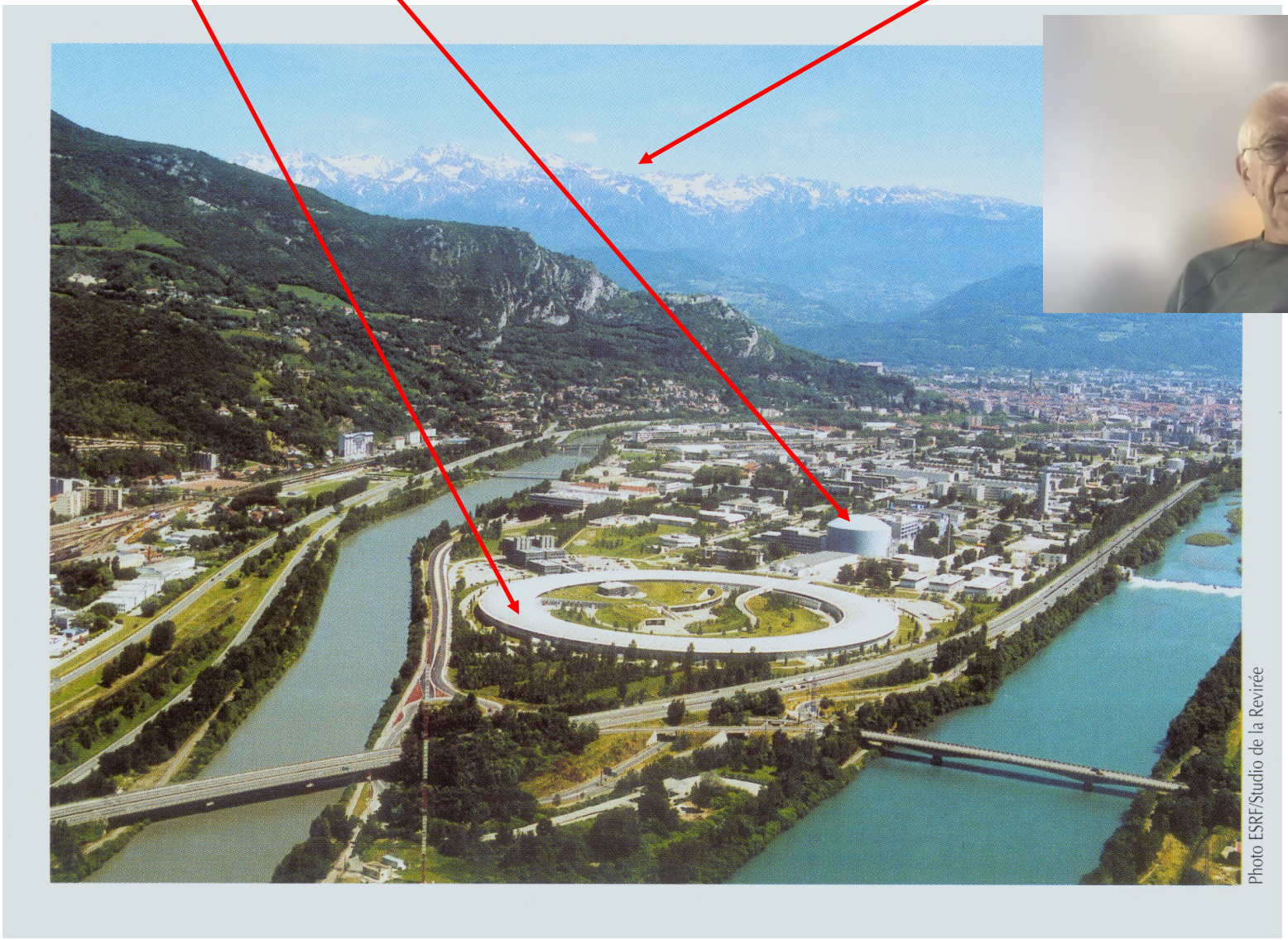
Nano-probe beamline

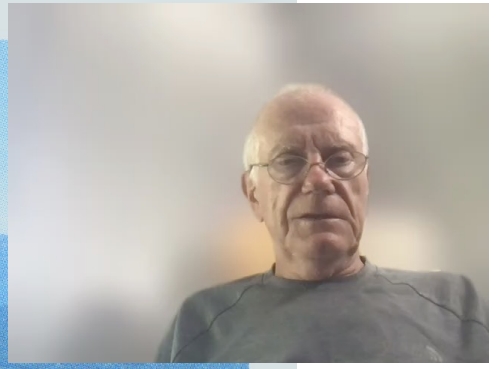


undulator



The ESRF* & ILL* With Grenoble & the Belledonne Mountains





*ESRF = European Synchrotron Radiation Facility; ILL = Institut Laue-Langevin