



Tutorial #3

High resolution VUV absorption spectroscopy @ the synchrotron SOLEIL: an efficient diagnostic for plasma physics

S. Béchu¹ & N. de Oliveira²

¹ LPSC-CRPMN, Grenoble (France)

² Synchrotron SOLEIL (France)

The DESIRS beamline at the SOLEIL synchrotron facility delivers a high flux in a large spectral range from 4 to 40 eV. In particular in the Vacuum-UV (VUV) part of the spectrum ($\lambda < 200$ nm) lies energy levels for important atomic species such as Hydrogen, Oxygen, Nitrogen or Carbon, setting the first allowed dipole transitions from the ground state. In this context, the Fourier Transform Spectrometer (FTS) end-station allows the measurement of absorption spectra with the required spectral resolution to determine column densities of such reactive species. Moreover, the ro-vibrational spectra of small molecules electronic states, could also be recorded, adding valuable information such as rotational or vibrational temperature, or giving access to metastable states or radical signatures.

During this tutorial, a brief description of the SOLEIL synchrotron facility focusing on the instrumentation available on the DESIRS beamline, in particular the VUV FTS, will be given. A few scientific examples of investigations, in the field of plasma physics, will be shown. A specific interest will be paid on rovibrationally excited molecules – H₂ and D₂ – in their electronic ground state and atoms – H and D – in the fundamental state. We will show how VUV absorption is particularly of interest to probe these species aiming at applications in nuclear fusion.