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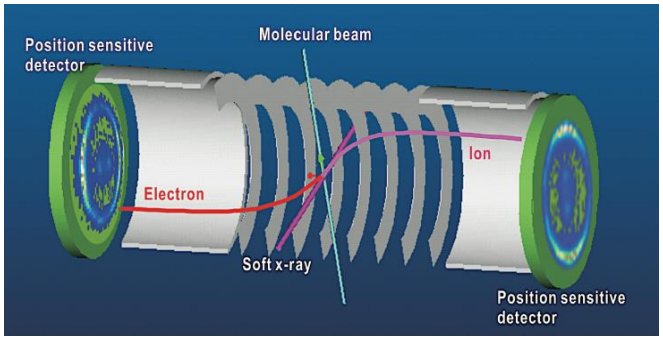
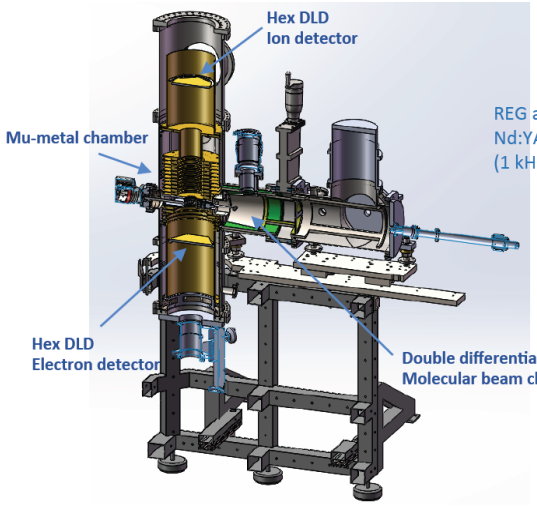
Ultrafast Laser, Synchrotron Radiation, Electron-Ion momentum Imaging, Mass Spectrometry

The deactivation of UV excited biomolecules through repulsive $\pi\sigma^*$ state accounts for the ultrafast decay pathway (so-called "photostability"). The narrow bandwidth of picosecond laser will be beneficial to perform the vibrational mode-specific excitation experiments of biomolecules. Thus, we established a picosecond laser system, which could perform UV-VUV pump-probe experiments. Using vacuum ultraviolet light (VUV) as universally and softly ionized method is valid to detect polyatomic photofragments, which are fragile against multi-photon ionization. By measuring the rate of product growing and time-resolved electron/ion momentum imaging, one can clarify the detail relaxation mechanism of UV excited biomolecules.

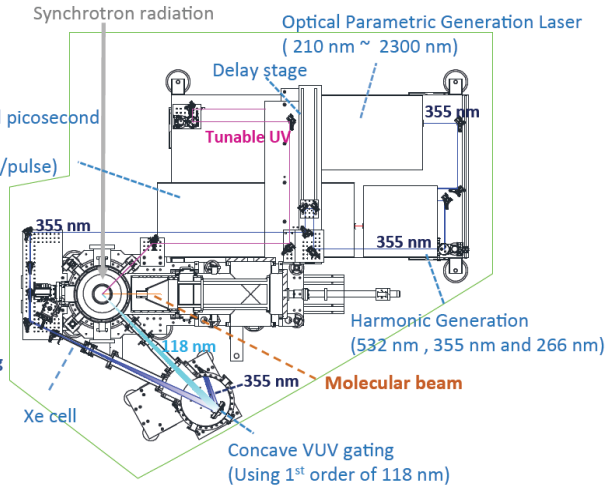
Soft X-ray core-level spectroscopy has been used as a powerful analyzing tool in material and chemical science due to its element-specific and site-specific capability (so called chemical shift). We plan to use the tunable soft x-ray synchrotron radiation light source to study the dynamics of site-specific dissociation of core-excited biomolecules. The possibility of localized Auger decay process after site-specific core-excitation could selectively break the chemical bonds, which is a valuable tool to control chemical reactions and mass spectrometric applications.

Coincidence electron-ion momentum image methods





Coincidence electron-ion velocity map imaging spectrometer



Pump-probe picosecond laser system