New WINDY beamline for photon induced desorption with DAΦNE synchrotron radiation at LNF

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Accelerators performances should not be affected by any vacuum issues occurring during operation. Inside their vacuum chambers, the pressure is dynamic and is affected by the interaction between beam and beam-pipe walls. In circular accelerators like LHC or FCC-hh and in all Synchrotron Radiation Facilities, the accelerated particles emit a high number of photons that interact with the wall of the vacuum beam-pipe. This interaction produces different detrimental effects: gas desorption, secondary electron emission, heat load, etc.. They may contribute to the instabilities and affect the beam lifetime and the accelerator performances. These effects are directly connected to material properties such as Secondary Electron Yield (SEY), Photon Yield (PY), Reflectivity, Photon and Electron Desorption Yield.

At LNF, thanks to the use of SR light emitted from a DAFNE bending magnet, we performed the first test experiments following simultaneously gas desorption, PY, SEY and surface chemistry modification (by using XPS spectroscopy) during focussed WL irradiation of a small LHC Cu sample at room temperature.

In order to improve the possibility to study the photo desorption yield of real long beam-pipes a new beamline has been design and realized. The new beamline, with a base pressure $P < 10^{-10}$ mbar, uses collimated white light, with a critical energy of ~ 200 eV, to irradiate beam-pipes with different length (up to 3 meters) at grazing angles, from less than 1 to 6 degrees. These conditions are as close as possible to the accelerators operating conditions in order to obtain results that can be used as realistic input parameter to simulation programs and to validate any proposed design.

The preliminary results and the realization of the new WINDY (White lIght liNe for Desorption Yields) beamline are presented.