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Desorption, scrubbing and surface modifications during Synchrotron Radiation light irradiation of accelerator walls.

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In FCC-hh, one of the most challenging issue will be to limit all possible instabilities that could occur. Expected instabilities are mainly related to the large number of photons and photoelectrons present in the vacuum beam-pipe. Photons and photoelectrons will induce gas desorption and single beam instabilities, whereas at LHC instabilities are dominated by e-cloud formation. It is, therefore, of paramount importance to study the effect of photon irradiation on technical materials, to experimentally address its capability to induce gas desorption and to modify the actual surface chemistry, as electron bombardment does, eventually reducing material Photo yield (PY) and Secondary Electron Yield (SEY).
Up to now, no clear experimental evidence is showing that photon irradiation "scrub", how efficient it is compared to electron scrubbing (the base mitigation processes used at LHC), what are the links between the two phenomena and what detailed surface chemistry changes are related to it and to the gas induced desorption.
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 LHC Cu at room temperature. Preliminary results are here briefly presented, suggesting their importance as input to simulation programs used to validate any proposed design.

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