

HRM (Harmonics Rejection Mirror)

Context

TLDR

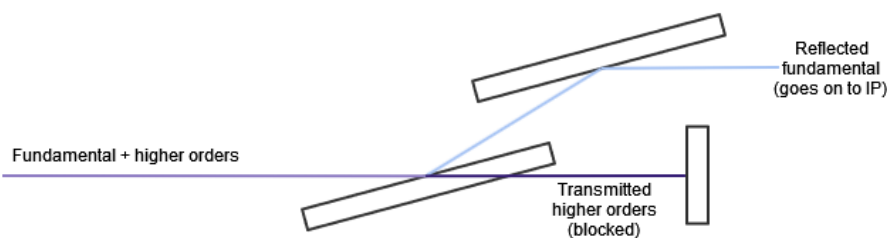
Photons of higher energies are generated by the undulators and needs to be blocked before they reach the interaction point (IP).

Details

The generation of x-ray by electrons passing through undulators produces, in addition of the fundamental energy, radiation at integer multiple of the fundamental energy, called harmonics. Because of symmetry, only the odd orders are allowed, so for example, for a fundamental at 5keV, photons at 15keV, 25keV, etc. are also generated.

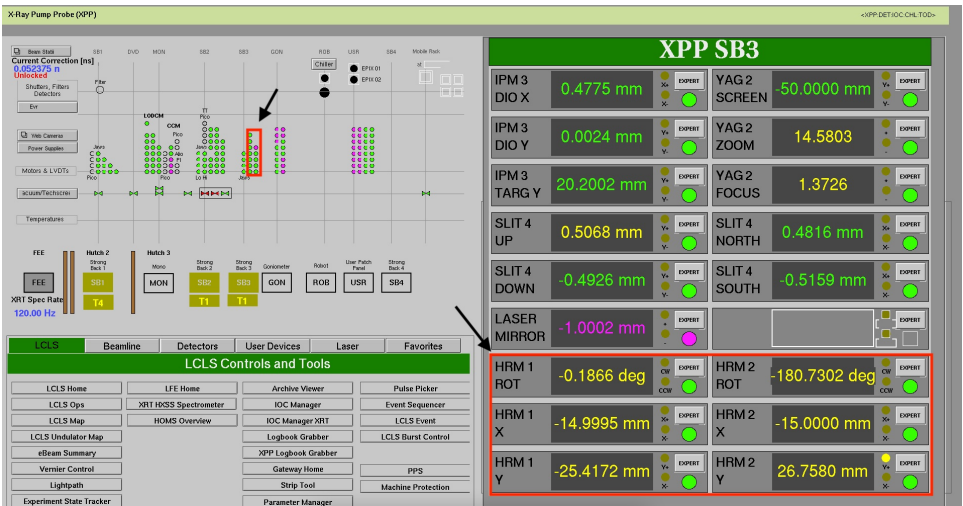
The intensity of successive orders drops very quickly, but the 3rd harmonic is still intense enough to create spurious and unwanted signals. Because photons of higher energy penetrates more in materials, the rejection of these higher order is not straight-forward. This in fact make the problem worse if the attenuator is used, as the fundamental is more attenuated than the higher orders, hereby worsening the ratio of "good" photons to unwanted ones. Moreover, because they are multiple of the fundamental energy, they are shared similar diffraction conditions, and diffraction-based approach do not work.

The solution is thus to use a pair of Silicon mirrors, which will reflects the fundamental while transmitting most of the third (and above) harmonics. This results in an offset position of the fundamental beam, as shown in the drawing below.



Screens

You can access motors relating to the HRM by clicking on the beamline related display (shown below).



More information about the HRM can be found [here](#).