NOVEL PHOTOEMISSION TYPE OF X-RAY BEAM POSITION MONITOR FOR THE 'WHITE' UNDULATOR RADIATION

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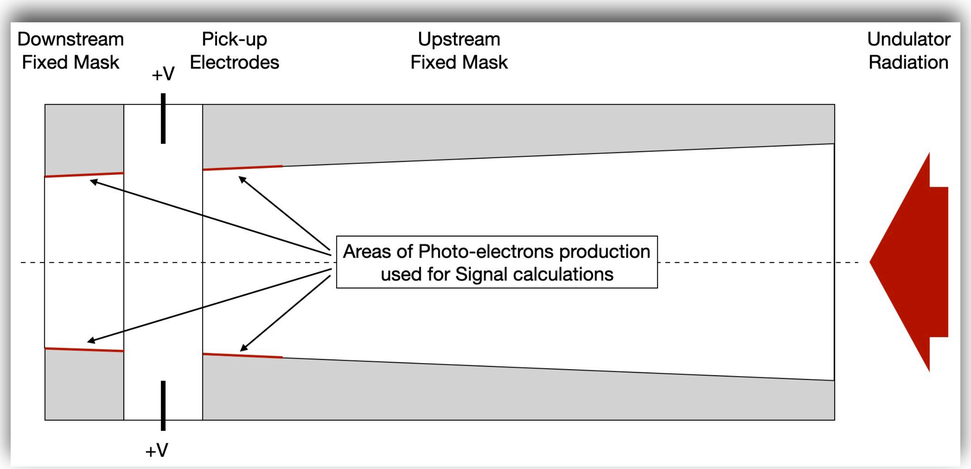
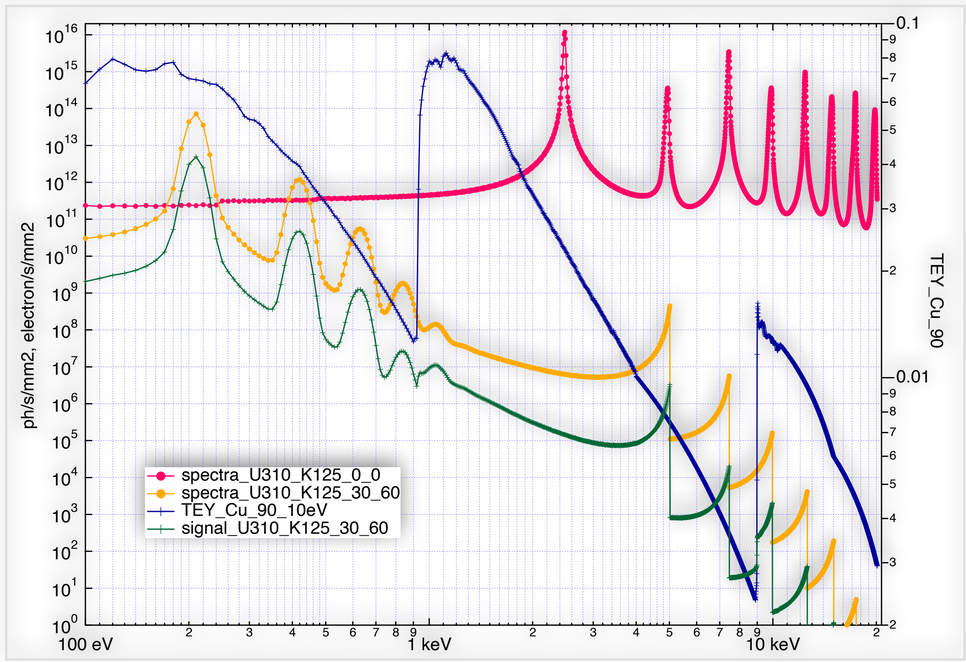
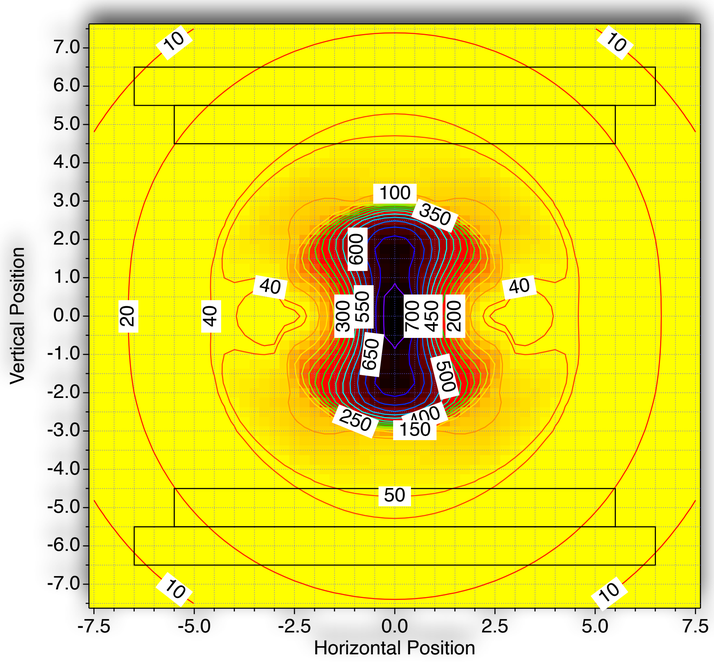
- A novel photoemission type of frontend XBPM for the ‘white’ undulator radiation is proposed
- The Photoemission Mask (PheM) XBPM is a part of the frontend fixed mask
- Fixed mask is the source of photoelectrons, which are collected by positively biased electrodes
- Positive bias of electrodes will eliminate the possibility of building a conductive deposit onto the insulator surfaces around the electrodes, preventing increase of the dark current
- Electrodes are hidden from the undulator radiation, so there is no high heat load onto the detection part, which simplifies the design and makes PheM XBPM operation more reliable
- PheM XBPM Signal spatial distribution and response were analyzed for various undulator radiation parameters
- PheM XBPM signal yield are higher compared to the blade type XBPM due to larger area of signal production
- PheM XBPM concept will simplify the overall beamline frontend design, and will directly defining the beam position relative to the frontend fixed mask. Due to design simplicity, it can be potentially installed at the frontends already in operation

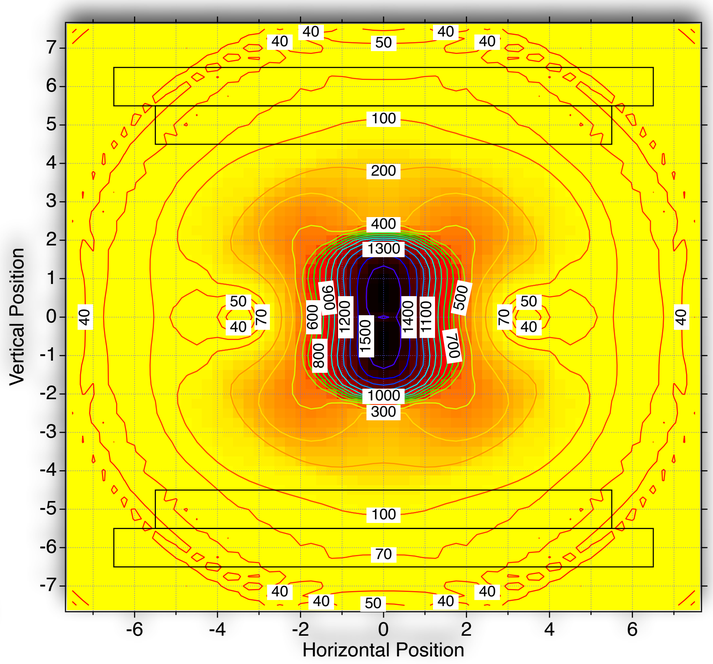




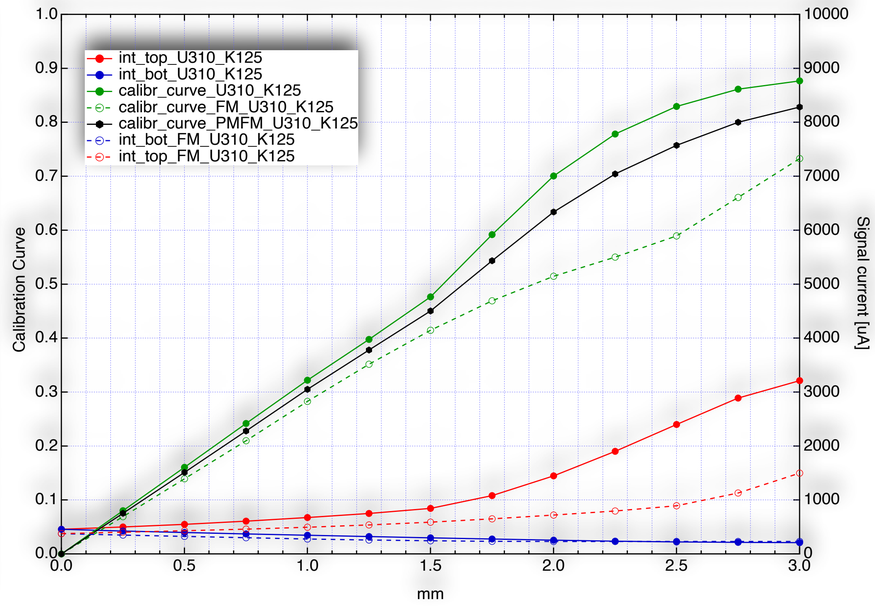
Undulator radiation flux spectral density of MAX-IV CoSAXS planar undulator, K=1.25: on-axis (pink), 0.7 mrad (yellow). Signal spectral density at 0.7 mrad (green). Copper TEY (blue)



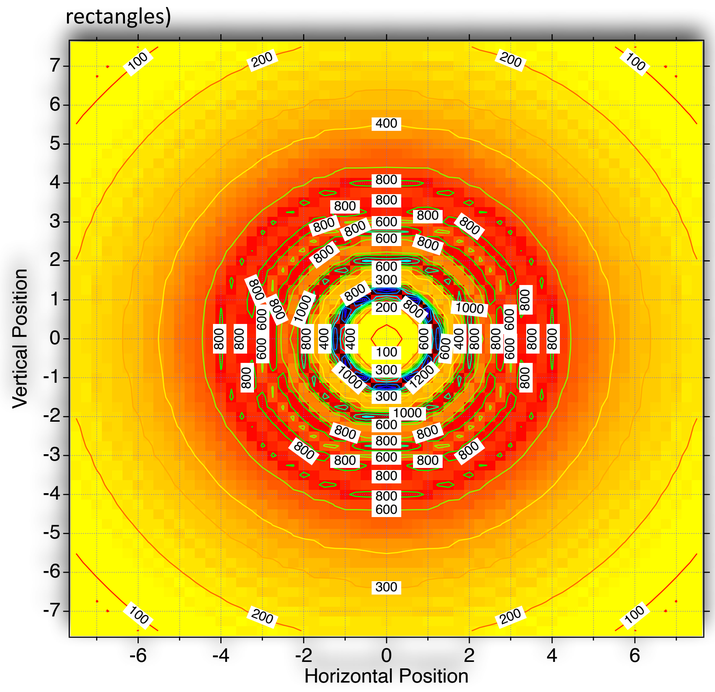
PheM XBPM signal [μA/mm2] spatial distribution at 10 m, MAX-IV CoSAXS planar undulator, K=1.25. Rectangles are indicating photoemission production areas used for signal calculation: upstream FM (outer rectangles), downstream FM (inner rectangles)



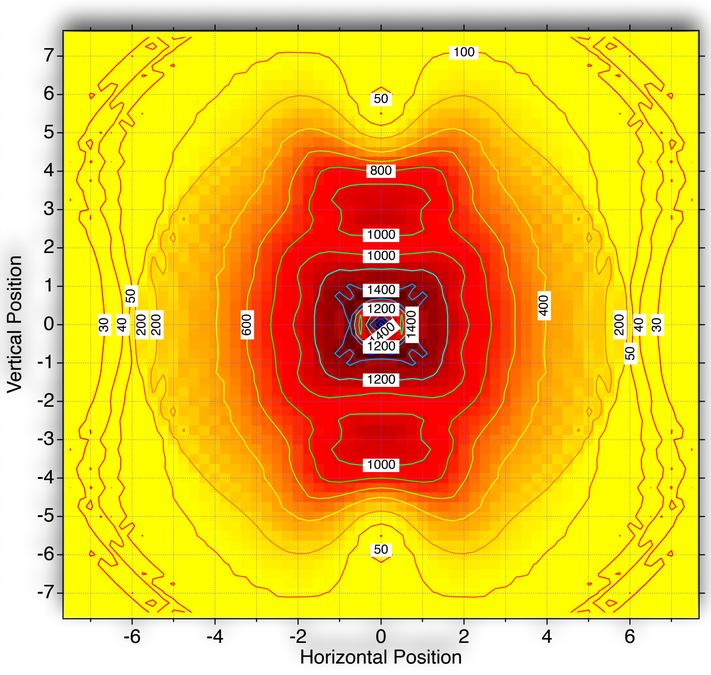
PheM XBPM signal [μA/mm2] spatial distribution at 10 m, MAX-IV CoSAXS planar undulator, K=2.0



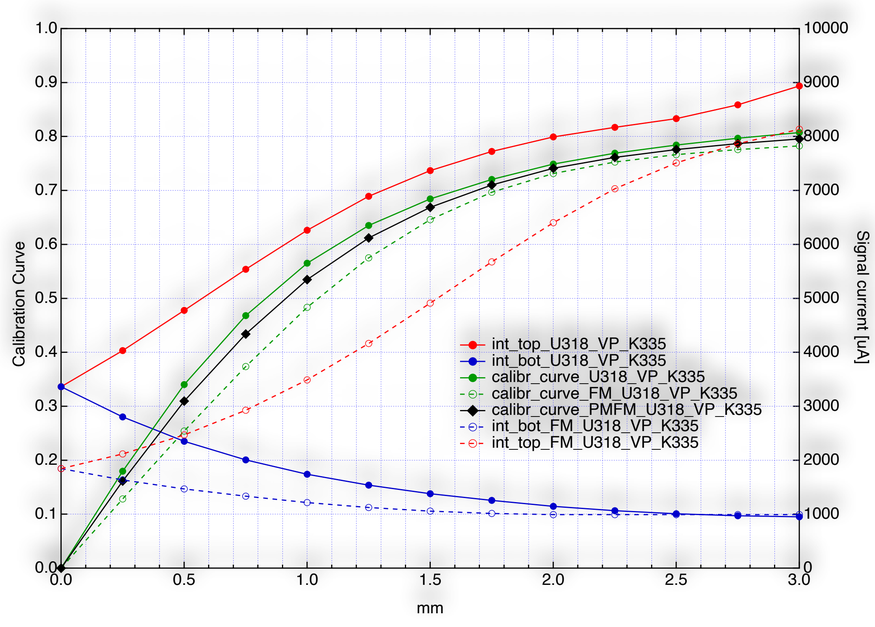
PheM XBPM Signals (red and blue) and Calibration curves (green), total (black), MAX-IV CoSAXS undulator, K=1,25 at 10 m



PheM XBPM signal [μA/mm2] spatial distribution at 10 m, MAX-IV SoftiMAX APPLE undulator, circular polarization, Kx=3.35, Ky=3.35



PheM XBPM signal [μA/mm2] spatial distribution at 10 m, MAX-IV SoftiMAX APPLE undulator, vertical polarization, Ky=3.35



PheM XBPM Signals and Calibration curves, MAX-IV SoftiMAX APPLE undulator, vertical polarization, Ky=3.35 at 10 m

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MAX IV Laboratory

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