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Isolating the light of a single bunch: determining the viability of operating vertical-plane ‘Pulse Picking by Resonant Excitation’ at Diamond-II to serve timing mode users

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“Pulse Picking by Resonant Excitation” (PPRE), first developed by Holldack et al.* at BESSY in 2014, is a beam operation method that simultaneously serves standard synchrotron users and ‘timing mode’ users who require precise X-ray pulse timing from single bunches. PPRE selectively enlarges one electron bunch’s (horizontal) emittance through resonant excitation, creating an enlarged X-ray beam. A beamline can isolate this X-ray beam with their optical apertures whilst blocking the light from regular bunches. We investigate implementing PPRE in the vertical plane –an approach never before demonstrated but potentially advantageous for timing users –using Diamond’s existing multi-bunch feedback (MBF) system to assess potential capability for Diamond-II, a 4th generation light source. This paper reports on the efficacy of providing vertical PPRE using an MBF by demonstrating live measurements from the I19 beamline, and then by contextualising the results with simulations as part of preparations for Diamond-II.

Footnotes

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