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Quasi-periodic Apple-knot undulator for Diamond Light Source

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The user community of the Angle-Resolved Photoemission Spectroscopy (ARPES) beamline in Diamond Light Source (DLS) is strongly interested to use the lower photon energies down to 10 eV compared to the current 18 eV in both Diamond and the future 3.5 GeV machine Diamond-II. The high level of the heat load on the first optic as well as the undesired higher harmonics contamination are two major challenges for the beamline operation. The Quasi-Periodic APPLE-KNOT (QP-AK) undulator is a potential candidate to resolve these two issues. This paper presents the magnetic design and reports the overall performance of the undulator in terms of flux, polarisation degree and partial power. The linear and non-linear beam dynamics effects of the undulator are investigated by the kick-map approach. Active shims will be used to suppress the dynamic multipoles of the device, as used with the current APPLE-II device. The beam dynamics studies show the minimal impact on beam lifetime and injection efficiency and residual beta-beat in Diamond and its upgrade.

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Footnotes

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Yes

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