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## An X-Ray Regenerative Amplifier Free-Electron Laser Using Diamond Pinhole Mirrors

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X-ray free-electron lasers (FELs) rely on SASE due to the lack of seed lasers and the difficulty in obtaining mirrors. Progress in diamond crystal Bragg mirrors enables the design of x-ray FEL oscillators. Regenerative amplifiers (RAFELs) are high gain/low-Q oscillators that out-couple most of the optical power. An x-ray RAFEL based on the LCLS-II at SLAC using a six-mirror resonator out-coupling 90% or more through a pinhole in the first downstream mirror is analyzed using the MINERVA and OPC to model the optical field within the undulator and the remainder of the resonator respectively.<sup>1</sup> Results show substantial powers at the fundamental (3.05 keV) and 3rd harmonic (9.15 keV).

1. H.P. Freund, P.J.M. van der Slot, and Yu. Shvyd'ko, "An X-Ray Regenerative Amplifier Free-Electron Laser Using Diamond Pinhole Mirrors," New J. Phys. 21, 093028 (2019).

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