Diffractive Imaging Using Coherent Synchrotron X-rays at a Proposed Energy Recovery Linac Source

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X-ray coherent diffractive imaging allows microscopy at nanometer resolutions. This work developed a simple method to estimate the resultant signal for various types of specimens. A simulated case study using the proposed energy recovery linac (ERL) source is presented and confirms the estimated flux requirement. Based on this result we conclude that the resolution could reach to 3-5 nm in diffractive imaging experiments on biological specimens of 100nm in size. For radiation-resistant non-biological nanostructures and nanocomposite materials, a higher spatial resolution close to atomic resolution may be obtained. This technique would open up new areas of research in structural science that would include not only crystalline samples done today but also non-crystalline specimens in the future.

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