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”4H” X-ray Camera

Fast X-ray imaging using 30 keV and above X-ray photons is highly desirable for studies of dynamic material evolution and discovery of new materials. The state-of-the-art single-line-of-sight X-ray camera technology, which is mostly based on silicon sensors and silicon Application Specific Integrated Circuits (ASICs), cannot meet the requirements because the atomic number of silicon is only 14 (“Low-Z”), and the highest speed achieved so far is less than 10 MHz frame-rate in X-ray Free Electron Laser (XFEL) environment. Fast readout chips with an equivalent frame rate above 100 MHz do exist through on-board data storage. Therefore, it is possible to construct “4H” X-ray cameras for high-energy XFELs. “4H” stands for high-Z (Z>30) sensor, high-resolution (less than 300 micron pixel pitch), high-speed (above 100 MHz), and high-energy (above 30 keV in photon energy).

Summary

We discuss progress and plans to realize such a technology.

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