Advanced Laser-Driven Femtosecond Sources of Hard X-Rays

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The development of laser-plasma sources for generating X-rays has been an active area of research for many years and has enabled a wide range of applications [1]. A variety of target concepts—including rotating cylindrical targets, tape targets, and wire targets—have been developed to support applications ranging from microlithography to advanced X-ray imaging.

Recent progress has demonstrated that metallic liquid jets are also highly promising targets for producing X-rays with photon energies reaching several tens of keV. In addition, nanoscale targets have been shown to enhance X-ray flux in a broad variety of experiments. These emerging secondary sources are expected to become increasingly important as the average power of ultrashort-pulse lasers has recently advanced well into the kilowatt regime [2]. Because the X-ray dose rate scales proportionally with average laser power, the associated radiation hazards must be carefully considered [3]. This talk presents an overview of recent advances in laser-plasma X-ray sources and discusses potential hazards arising from the interaction of intense laser pulses with matter [4,5].

References

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