**High Energy Density Science with Extreme Light**

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Recent advent of X-ray Free Electron Laser (XFEL) and PW lasers, delivering light with extreme brilliance, opens up the new era for various fields of research. High energy density (HED) science, the study of matter at extremely high pressures and temperatures, is one of those benefited enormously from these light sources. As an emerging subfield of physics intersecting multiple disciplines, such as plasma, condensed matter, and astrophysics, it is a field rich in new physics phenomena and compelling applications, propelled by advances in high performance computing and advanced measuring techniques. In this talk, I will introduce basic concepts in HEDS, XFEL and high-power lasers, and review some key experiments which my group has been involved. I will also conjecture on some of the future directions in HEDS that can be exploited with these extreme light sources.