

Intense laser-matter interaction: Producing bright terahertz-to-gamma rays and probing the quantum vacuum

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A recent advent of multi-petawatt (PW) lasers has attracted much attention around the world due to its capability of producing unprecedentedly high intensities and thus opening up new opportunities in many areas of fundamental physics. Those include ultra-relativistic particle acceleration, high-brilliance secondary radiation generation, high-energy density plasma physics, laboratory astrophysics, photonuclear physics, and strong-field quantum electrodynamics (QED). In this talk, I will give a brief overview of intense laser-matter interaction and also a few research topics on strong terahertz field physics, ultrafast diagnostics, laser-driven QED physics, and vacuum polarization which can be explored with the state-of-the-art lasers at the Center for Relativistic Laser Science (CoReLS).