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Strong-field interactions and ultrafast control

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We give a perspective on recent advances and opportunities in the theory of strong field, attosecond, and ultrafast x-ray physics. These advances are enabled by the development of intense sources that range from the mid-infrared all the way to the x-ray regime, and which have durations down to below 100 attoseconds. They challenge AMO theorists to develop increasingly powerful methods for describing many-electron systems subject to ultrafast and intense electromagnetic fields. We discuss examples including attosecond measurements of electron emission and photon absorption, high-harmonic imaging of chemical dynamics, and multiple photoionization using x-ray lasers.