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Attosecond Electron Imaging.

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Ultrafast Electron Microscopy and Diffraction has been demonstrated to be an effective table-top technique for imaging the atomic motion in real time and space. However, imaging the faster motion of electron dynamics has remained beyond reach due to the lack of temporal resolution and the time jittering between the pump"laser" and the probe "electron" pulse. Recently, we demonstrated the ability to control the temporal profile of the electron pulses using ultrashort laser pulses, the approach we called the optical gating. The recent advancement in attosecond physics and the generation of optical attosecond pulses open the door for generating sub-femtosecond electron pulses by the attosecond optical gating to attaining the desired temporal resolution in electron microscopy and diffraction imaging experiment, to establish what we so-called "Attomicroscopy", which enable the imaging of electron motion in the act. Such electron imaging would reveal the quantum physics of complicated systems. Also, it will provide real-time access to electron dynamics in atoms and molecules and improve our understanding of chemistry.