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X-ray pump / X-ray probe femtosecond coherent diffractive imaging of electron dynamics in pristine and embedded xenon clusters CAMILA BACELLAR, ADAM CHATTERLEY, JAMES CRYAN, MICHAEL ZIEMKIEWICZ, OLIVER GESSNER, Lawrence Berkeley National Laboratory, CHARLES BERNANDO, LUIS GOMEZ, CURTIS JONES, RICO TANYAG, ANDREY VILESOV, University of Southern California, TAIS GORKHOVER, MARIA MUELLER, DANIELA RUPP, THOMAS MOELLER, TU Berlin, JOHN BOZEK, MAXIMILIAN BUCHER, SEBASTIAN CARRON, KEN FERGUSON, CHRISTOPH BOSTEDT, SLAC National Accelerator Laboratory — Femtosecond time-resolved coherent diffractive imaging (CDI) experiments on pristine Xe clusters and Xe clusters embedded in superfluid helium nanodroplets have been performed using a new undulator-based X-ray pump/X-ray probe technique at the Linac Coherent Light Source (LCLS). The study aims at elucidating electron dynamics in sub-micron sized clusters induced by irradiation with intense X-ray pulses. A combination of single-shot CDI images in coincidence with single-shot ion mass spectra is employed to obtain a detailed time-resolved picture of ultrafast ionization, nanoplasma formation, charge migration and, ultimately, disintegration of the noble gas clusters. The measurements on Xe clusters embedded in He nanodroplets will be discussed in the light of potential damage control ("tamper") mechanisms provided by the layer of helium atoms around the Xe core.

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