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Interaction of clusters with intense soft x-ray radiation from the VUV-FEL

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The interaction of rare gas clusters with intense vacuum ultraviolet radiation from the DESY TTF1 FEL operating at 100 nm wavelength has yielded many surprising results. For rare gas clusters unexpected high energy absorption was measured and thermionic electron emission was observed. Already at 10^{13} W/cm² the clusters completely disintegrated in a coulomb explosion. These results indicate that for cluster in intense laser fields down to 100 nm very efficient energy absorption mechanisms exist. From a theoretical point of view new explanations for the observed energy absorption were suggested, including atomic corrections to the inverse Bremsstrahlung potentials or high intermediate charge states in the cluster. In fall 2005 the DESY VUV-FEL became operational, currently producing intense soft x-ray radiation with 32 nm wavelength and power densities of up to 10^{14} W/cm². In the talk first results of the laser cluster interaction at this reduced wavelength will be presented. The data show less efficient energy absorption from the laser field and no thermionic electrons. The results will be discussed and compared to the 100 nm experiments.