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Ultrafast hydrogen atom dynamics of small hydrocarbon molecules in intense laser fields - Ejection of H₃⁺ and hydrogen migration

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In ultrashort intense laser fields, molecules are decomposed into fragments via a variety of dissociation pathways. Among them, ultrafast migration of hydrogen atoms within molecules as well as efficient ejection of H₃⁺ molecular ions are noteworthy [1]. By referring to our recent studies on small hydrocarbon molecules in intense laser fields [2] by the coincidence momentum imaging method [3], I will show how ultrafast dynamics of hydrogen atoms are induced within duration of ultrashort intense laser pulses.

[1] Y. Furukawa, K. Hoshina, K. Yamanouchi, H. Nakano, Chem. Phys. Lett. 414, 117 (2005).

[2] T. Okino, Y. Furukawa, P. Liu, T. Ichikawa, R. Itakura, K. Hoshina, K. Yamanouchi, and H. Nakano, Chem. Phys. Lett. 419, 223 (2005).

[3] H. Hasegawa, A. Hishikawa, K. Yamanouchi, Chem. Phys. Lett. 349, 57 (2001).