



Nanoparticles catalyze exotic molecular processes in intense laser fields: real implications in the Earth's atmosphere

Prof. Deepak Mathur

Formerly Distinguished Professor and J C Bose National Fellow, Tata Institute of Fundamental Research, and Founding Director, UM-DAE Centre for Excellence in Basic Science

Re-entry of satellites into the earth's atmosphere leads to the formation of metallic nanoparticles which can act as catalysts for unusual molecular reactions. Results will be presented of an international experimental study involving the author to explore formation of gaseous H_3^+ ions from water molecules condensed on SiO_2 nanoparticles (100-300 nm size) upon irradiation by intense laser light. The results {Nature Commun. 12, 3839 (2021)} show that nanoparticles not only act as a catalyst in forming H_3^+ cations from water, they also lead to dramatic enhancement of their momenta and energy.

Deepak Mathur joined TIFR in October 1981 as a Visiting Fellow, with a mandate to initiate an experimental programme in atomic and molecular physics. He retired in April 2017 as Distinguished Professor and J.C. Bose National Fellow.. He was awarded the Bhatnagar Prize, the European Union's Erasmus Mundus Fellowship at Imperial College London, the Royal Society Guest Fellowship at the University of Oxford. He is a Gold Medallist of the International Society of Ultrafast Intense Laser Science, AND been THE co-Editor of Europhysics Letters, Editor Board Member of Rapid Communications in Mass Spectrometry, Pramana, and the Indian Journal of Pure and Applied Physics; he has published several monographs.



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