MAR06-2005-000121

Abstract for an Invited Paper
for the MAR06 Meeting of
the American Physical Society

Adventures in Cluster Dynamics

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We report on the exploration of new scientific territories of energetics, response, dynamics and function of large, finite atomic and molecular systems. Studies of ultrafast (attosecond to femtosecond) electron and nuclear dynamics of clusters in ultraintense laser fields (peak intensity 10^{15}–10^{20}Wcm^{-2}) led to the advent of table-top nuclear fusion driven by cluster Coulomb explosion. The eighty years' quest for nuclear fusion driven by chemical reactions was achieved by "hot–cold" fusion in the chemical physics laboratory. Moving from femtosecond nuclear dynamics in the energy domain of nuclear physics (1keV–1MeV) towards ultralow energies and ultraslow millisecond dynamics in ultracold (T = 100μK–1nK) finite systems, we address the bridging between the nuclear dynamics of clusters and of finite, ultracold atomic clouds.

References

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