The Search for Physics Beyond the Standard Model, Chirality, Trace Detection and Sticking using Cold Molecules

J.M. Doyle

Department of Physics, Harvard University, Cambridge, Massachusetts 02138, USA.
e-mail: doyle@physics.harvard.edu

Research using cold molecules has produced significant scientific results in several areas of science including particle physics, condensed matter physics and physical chemistry. In this talk I will give an overview of our recent experiment that used cold molecules to place a new limit on the electron electric dipole moment. This strongly constrains possible new physics at the TeV scale. I will also describe collision studies with cold polyatomic molecules, and a new approach to determining the chirality of molecules. I will discuss the experimental success of this new chiral detection method, our efforts on trace detection using buffer-gas cooling, and our progress on answering the question of sticking of single atoms to large molecules at low temperatures.