ions. The bulk of this effort was funded by the NSF in preparation for our studies of photochemical and photophysical processes occurring with chemisorbed species on the surface of cluster ions. But the apparatus is quite general, and will be superb for the study of bare metal cluster ions as well. In accord with our operating understanding, any research on this new apparatus devoted to the study of bare metal clusters will be considered to be part of the DOE contract research, and we will make an attempt to keep this work as separated as reasonable from the NSF-supported research on chemisorbed adducts of metal clusters.

Initial experiments have been completed with this apparatus and a manuscript will shortly be submitted. The key feature is the use of a long drift tube to separate the various cold cluster ions by mass, all clusters other than that desired being deflected away by a computer-controlled pulsed "mass gate" consisting of a pair of electrodes isolated by grids. This turns out to be an exceedingly clean and effective means of providing mass selection at high transmission -- we achieve a mass resolution of 500 to 1 with nearly 100% transmission for a 1 cm diameter ion beam. The mass selected set of cold cluster ions is then decellerated to roughly 30 eV as it enters a high vaccuum chamber. As it enters the chamber it is irradiated by a coaxial, counter-propagating dye laser beam pulse, and allowed to drift for 10 cm before the ions are pulsed out at a right angle and directed down a second time-of-flight tube. This second mass analysis allows us to determine if the original mass-selected clusters fragmented as a result of laser irradiation, and, if so, what daughter ions were formed. The over-all experiment is