

The University of Notre Dame Nuclear Structure Laboratory

Report to SNEAP October 2006

L.O. Lamm

Department of Physics, University of Notre Dame, Notre Dame, IN, USA 46556

E-mail: Larry.O.Lamm.1@nd.edu

Our model KN Van de Graaff accelerator has completed the most successful year of operations since being relocated to Notre Dame, due in large part to the success of the Siegling America belt (Type E8/2 U0/U2 MT-NA) that we reported on at SNEAP 2005. This belt has now been in operation for more than 1300 hours, with the KN being operated for experiments for more than 160 days during the past year. The combination of the new Siegling belt with "old-style" mesh charging screens have resulted in stable operations for an extended period of time, and several important experimental nuclear astrophysics results have been measured with this machine.

Our model JN Van de Graaff accelerator shares the KN accelerator vault, and as such, operation of the JN during the past year was extremely limited due to the extensive KN running schedule. In addition, we have recently undertaken a complete re-configuration of the control hardware and software for the JN accelerator, an effort which we can continue while the KN is in operation.

Our model FN Tandem Van de Graaff accelerator has had an extremely successful year of operations, with more than 3200 hours of operations since October 2005. As we reported at SNEAP 2005, we replaced our tank gas with a mixture containing only N₂ and SF₆, and since that time we have experienced nearly spark-free running conditions, often running more than 200 hours of continuous operations at voltages of 9.75 MV and higher without a single spark. There have been no problems with the pelletron chains, which plagued us all of last year, and we have not opened the FN Tandem accelerator since September 2005.

Our renovation of the Browne-Buechner 100 cm Broad Range Magnetic Spectrograph for use as an AMS facility have been completed to the point that initial results have been obtained. The spectrograph has been operated in gas-filled mode, and initial tests of our ability to separate isobars have proved very encouraging. We tested isobaric separation using the mass 58 isobars for Ni and Fe, and were able to easily separate these isobars on the focal surface of the spectrograph. We have acquired a Wien filter for use with this facility, which we hope to install in the very near future.

Our ion sources continue to provide excellent beams for the FN Tandem accelerator. The SNICS sputter source provides all beams except helium, and our helium ion source (duoplasmatron with lithium charge exchange) remains operational, though we are currently renovating the source to operate from a high voltage platform. This will improve our ability to produce bunched ³He beams for a series of anticipated experiments.

Acknowledgments

The Nuclear Structure Laboratory at the University of Notre Dame is supported, in part, by a grant from the National Science Foundation as well as funds from the University of Notre Dame.