Update on the upgrade of the Oxford detector – part 1

A. Spiridon, R. Chyzh, M. Dag, E. McCleskey, M. McCleskey, B. T. Roeder, A. Saastamoinen, R. E. Tribble, L. Trache, E. Pollacco,[1] and G. Pascovici[2]

[1]*IRFU, CEA Saclay, Gif-sur-Yvette, France*

[2]*Institut fuer Kernphysik der Universitaet zu Koeln, D-50937 Koeln, Germany*

Two years ago, we started work on upgrading the Oxford detector – one of the two focal plane detectors of the Multipole-Dipole-Spectrometer (MDM). In the nuclear astrophysics group, this setup has been used primarily to study scattering and transfer reactions involving nuclei with A≤26. However at higher masses than that, we found that we are having significant difficulties in particle identification due to the insufficient resolution of both the dE and E signals.

The upgrade being developed is intended to improve the detection of both of these signals. In the Oxford detector, energy loss comes from the ionization of isobutane by secondary beam particles and it is measured with three aluminum anode plates (for details see Ref. [1]). Currently, only the first two plates are connected and give us a signal with a reasonable energy resolution. The third plate gives a signal too noisy to be of any use. We proposed to improve the latter by introducing Micromegas [2]. The design of these detectors is similar to a gridded ionization chamber and provides gains of ~ 10^4, as well as very good resolution (see Ref. [3] for more information on the upgrade).

Over the last year, we finished the design of the new detection pads and ordered them from the manufacturer. They are expected to be completed in May 2014. We are also working on modifying the current chamber in order to have the necessary electrical feedthroughs for processing the additional signals. We have ordered most of the necessary cables and connectors and expect to have them by mid-May.

We are aiming to be ready to do initial testing – to characterize the Micromegas – in June 2014. Depending on the results of this, we may be able to use the modified Oxford detector in an experiment planned for September 2014.

For information on improving the residual energy signal, see part 2 of this paper in the same annual report.

[1] D.H. Youngblood *et al.*, Nucl. Instrum. Methods Phys. Res. **A361**, 359 (1995); M. McCleskey, Ph.D Thesis, Texas A&M University (2011).

[2] Y. Giomataris *et al.*, Nucl. Instrum. Methods Phys. Res. **A376**, 29 (1996).

[3] A. Spiridon *et al.*, *Progress in Research*, Cyclotron Institute, Texas A&M University (2012- 2013), p. IV-50.