

# High energy resolution alpha spectrometry using cryogenic detectors

N. Coron<sup>1</sup>, J. Leblanc<sup>1</sup>, P. de Marcillac<sup>1</sup>, E. Leblanc<sup>2\*</sup>, J. Bouchard<sup>2</sup>

<sup>1</sup> CNRS, Institut d'Astrophysique Spatiale, 91405 Orsay Cedex, France

<sup>2</sup> Laboratoire National de Métrologie et d'Essais - Laboratoire National Henri Becquerel, CEA Saclay,  
91191 Gif-sur-Yvette Cedex, France

For applications such as environment monitoring, alpha emitters activity measurement associated with isotope identification is required. Magnetic spectrometers allow achieving excellent energy resolution, however in some cases their detection efficiency is not easy to determine with little uncertainty. Moreover the instrument may require the use of relatively high activity sources. Conventional silicon detectors are intrinsically limited in energy resolution. For both cases, energy loss in the source contributes to degrade the final energy resolution in the spectrum. Compared to magnetic spectrometers, cryogenic detectors give access to large detection efficiency associated with relatively good energy resolution. Spectra with better than 6 keV FWHM energy resolution have been obtained for several external alpha emitting sources using a copper-germanium bolometer specially developed for alpha spectrometry. This detector has an exchangeable absorber. The detection principle is based on the conversion of particle energy into heat in the absorber. Next step will be the measurement of a source fully enclosed in a sandwich absorber. This geometry provides a perfect 4 pi solid angle detection. Moreover, since any energy loss of alpha particles in the source itself should result in heat, one should expect the detector to collect the full energy of any alpha particle emitted by the source plus the energy of the recoil nucleus, leading to unprecedented energy spectrum information.

Subject area: Radionuclide metrology techniques

\*) Elvire Leblanc  
CEA Saclay  
DRT / DETECS / LNHB  
91191 Gif-sur-Yvette Cedex  
France  
Tel. : +33 1 69 08 23 32  
Fax : +33 1 69 08 26 19  
E-mail : elvire.leblanc@cea.fr