BrilLanCe detector energy resolution characterization at HI\(\gamma S\)

N. BROWN, M.W. AHMED, S. STAVE, S.S. HENSHAW, B.A. PERDUE, P.-N. SEO, H.R. WELLER, Duke U/TUNL, P.P. MARTEL, A. TEYMURA\'Z\'\'AN, UMass, F. QUARATI, ESA/ESTEC — The High Intensity \(\gamma\)-ray source (HI\(\gamma S\)) produced a variable \(\gamma\)-ray beam in the energy range of 2.5 to 15.5 MeV with an energy resolution of 50-100 keV. The \(\gamma\)-ray spectra from several BrilLanCe detectors (manufactured by Saint-Gobain Ceramics and Plastics, Inc.) were collected over this range of energy. The beam energy resolution was monitored throughout the experiment using a High Purity Germanium (HPGe) detector, running in parallel. The energy resolution of the \(\gamma\)-ray beam was obtained using a Gaussian fit to deconvoluted HPGe data. Gaussian fits to the BrilLanCe detector spectra were then corrected for the beam energy spread to obtain the detector resolution. A 4\(''\) (diameter) x 6\(''\) (long) LaCl\(_3\)Ce detector, a 3\(''\) x 3\(''\) LaBr\(_3\)Ce detector and a 2\(''\) x 2\(''\) LaBr\(_3\)Ce detector are characterized in the present study. The energy resolution of each detector will be reported as a function of incident \(\gamma\)-ray energy from 2.5 to 15.5 MeV, and the response functions will be compared to spectra obtained with HPGe and NaI detectors.

\(^1\)Supported by US DOE Grant No. DE-FG02-97ER41033.

Nathaniel Brown

Date submitted: 30 Jun 2009