

MINIBALL at REX-ISOLDE: pioneering position-sensitive Ge detectors

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With the approval of the REX project at ISOLDE in 1995 an intensive discussion on the design and construction of a dedicated γ -ray array started. Due to the low intensity of the radioactive beams high detection efficiency was needed. On the other hand, as the γ -rays are emitted from nuclei moving with 5-10% of the speed of light a high granularity of the array was mandatory in order to limit the Doppler broadening of the γ -lines. The final decision was to extend the technology of the EUROBALL Cluster detectors to segmented Ge detectors and to develop digital electronics for a further enhancement of the position resolution by pulse shape analysis. MINIBALL so far consists of 24 encapsulated, 6-fold segmented Ge detectors which are mounted in 8 cryostats with three detectors each. Thus, it has a granularity of 144 which can be enhanced by one order of magnitude by pulse shape analysis.

A first commissioning experiment at REX-ISOLDE with a MINIBALL triple cluster detector was performed in September 2001 and the full array was installed in May 2002. Thus, we are looking back to 10 years of successful and reliable operation of MINIBALL at CERN and to an impressive list of scientific results.

MINIBALL was an important step in the development of position-sensitive Ge detectors. It has shown that reliable segmented Ge detectors can be produced and that the first interaction point of the γ -rays within the detector can be determined with a two-dimensional position resolution of ~ 5 -8mm by pulse shape analysis in real-time. These results encouraged the development of highly segmented Ge detectors which are position-sensitive in three dimensions allowing a full tracking of a γ -ray being scattered and finally absorbed in the Ge detector. Two γ -ray tracking arrays, AGATA in Europe and GRETINA in the USA, started data taking in their demonstration phase. Both spectrometers use encapsulated, 36-fold segmented Ge detectors which are based on the technology developed for EUROBALL and MINIBALL.

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