Geometry and solid angle corrections for accurate measurement of multipole and parity mixing ratios using nuclear orientation

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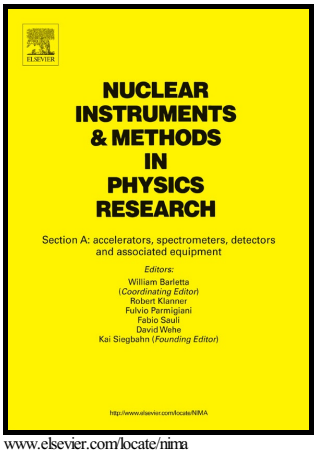

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Geometry and solid angle corrections for accurate measurement of multipole and parity mixing ratios usi and transition properties tation

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Abstract

In the context of nuclear orientation, we propose a new method to correct the multipole mixing ratios for asymmetries in the geometry of the setup but also in the detection system. This method is also robust against temperature fluctuations, beam intensity fluctuations and uncertainties in the nuclear structure of the nuclei. Additionally, this method provides a natural way to combine data from different detectors and make good use of all available statistics. We could use this method to demonstrate the accuracy that can be reached with the PolarEx setup now installed at the ALTO facility.

Keywords: Nuclear orientation, Multipole mixing ratio, Parity mixing ratio, Solid angle correction

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1. Introduction

The multipole mixing ratio (δ) for gamma-ray transition is a quantity directly related to the spins and parities of the initial and final states of that transition, therefore it reflects nuclear level structure and transition properties. The mixing ratio directly informs on the electromagnetic character of the radiation emitted from the nucleus. For example, a transition can be pure M1,

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