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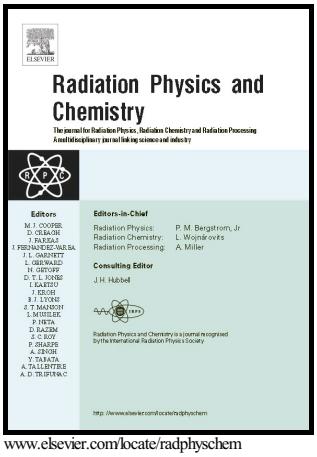

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Title page

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Evaluation of a neutron spectrum from Bonner spheres measurements using a Bayesian parameter estimation combined with the traditional unfolding methods

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ABSTRACT

In this work, a new program developed under MATLAB environment and supported by the Bayesian software WinBUGS has been combined to the traditional unfolding codes namely MAXED and GRAVEL, to evaluate a neutron spectrum from the Bonner spheres measured counts obtained around a shielded ^{241}AmBe based-neutron irradiator located at a Secondary Standards Dosimetry Laboratory (SSDL) at CRNA.

In the first step, the results obtained by the standalone Bayesian program, using a parametric neutron spectrum model based on a linear superposition of three components namely: a thermal-Maxwellian distribution, an epithermal (1/E behavior) and a kind of a Watt fission and Evaporation models to represent the fast component, were compared to those issued from MAXED and GRAVEL assuming a Monte Carlo default spectrum. Through the selection of new upper limits for some free parameters, taking into account the physical characteristics of the irradiation source, of both considered models,

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