Contribution ID: **367** Type: **Oral**

Neutron-Gamma Discrimination Using Non-Negative Matrix Factorization Blind Sources Separation Algorithms

Friday, 28 April 2017 09:40 (20 minutes)

In this study, we apply blind sources separation methods (BSS) based on non-negative matrix factorization techniques (NMF) to extract independent components from signals recorded at the output of fission chamber detectors. Since these modern signal processing methods require no hypothesis on the way that the signal and the noise are mixed, encouraged us to apply these methods to reach neutron-gamma discrimination in a soft way. For that reason, we use Geant4 as nuclear simulator, to model the neutron detection system installed inside the TRIGA MARK II Reactor (Nuclear facility of the Moroccan National Center for Nuclear Energy, Sciences and Techniques). The fission chamber is used in a research nuclear and a flux-mapping experiment is performed. We use the simulated fission chamber's output signals as time series mixtures that will be analyzed through non-negative and blind sources separation algorithms. The computation of performance index of each blind separation method will allow us to select the most efficient NMF algorithm that permit to achieve the best neutron-gamma discrimination. In addition, the computation of the auto and cross-correlation functions, the power spectral densities and time-frequency decomposition of the resulting independent components will provide a better characterization of these nuclear signals with very high precision.

Keys words: NMF, GEANT4, Fission Chamber

Country/Organization invited to participate

Morocco

Primary author: Ms ARAHMANE, Hanane (University Mohammed V, Faculty of Sciences, Rabat, Morocco)

Co-authors: Ms HAMZAOUI, El Mehdi (Nuclear facility of the Moroccan National Center for Nuclear Energy, Sciences and Techniques, Rabat, Morocco.); Mr CHERKAOUI EL MOURSLI, Rajaa (University Mohammed V, Faculty of Sciences, Rabat, Morocco)

Presenter: Ms ARAHMANE, Hanane (University Mohammed V, Faculty of Sciences, Rabat, Morocco)

Session Classification: B15

Track Classification: RADIATION TECHNOLOGIES FOR MEASUREMENT