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Beta Decay Spectra Measurements for the Study of Reactors' Antineutrino Spectra.

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Recent predictions of reactors $\bar{\nu}$ spectra have revealed two irregularities: the Reactor Antineutrino Anomaly (RAA) and the spectral "bump" [1,2,3]. These predictions, calculated with the Huber-Muller Conversion model [4,5], have provoked several doubts about the integrity of experimental data and the accuracy of the models used. In view of this, improved measurements of nuclear data of relevant isotopes, and the use of the Summation Calculation method [6] to determine reactors $\bar{\nu}$ spectra, present an alternative to the Conversion model. Calculations of reactors $\bar{\nu}$ spectra employing β feedings from standard databases may suffer from the Pandemonium Effect, which can be mitigated by using the Total Absorption Gamma Spectroscopy (TAGS) technique [7].

The decays of a relatively small number of neutron rich fission products contribute the most to reactors $\bar{\nu}$ spectra within the regions where the effects of the RAA and the "bump" are stronger [8]. Therefore, to directly determine reliable energy distributions (or shapes) of these β decay spectra, experimental campaigns have been performed at the IGISOL facility (Jyväskylä, Finland) with newly developed telescope detectors. Several β decay spectra of utmost relevance for the study of the RAA and the "bump" have been measured in the I233 (2022) and I233add (2023) experiments.

This presentation is dedicated to introduce the problem of the RAA and the "bump", and how the calculations of reactors $\bar{\nu}$ spectra are improved with the use of the Summation method and TAGS β feedings. Preliminary results of the analysis of the data of the I233 experiment will be shown.

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Primary author(s) : Mr. ALCALÁ, G. A. (Instituto de Física Corpuscular (IFIC), València, Spain.); Dr. ALGORA, A. (Instituto de Física Corpuscular (IFIC), València, Spain.); Dr. FALLOT, M. (SUBATECH, CNRS/IN2P3, IMT Atlantique, Nantes Université, Nantes, France.)

Co-author(s) : Dr. ESTIENNE, M. (SUBATECH, CNRS/IN2P3, IMT Atlantique, Nantes Université, Nantes, France.); Dr. GUADILLA, V. (SUBATECH, CNRS/IN2P3, IMT Atlantique, Nantes Université, Nantes, France.); Mr. STUTZMANN, J.-S. (SUBATECH, CNRS/IN2P3, IMT Atlantique, Nantes Université, Nantes, France.); Dr. GELLETLY, W. (Department of Physics, University of Surrey, Guildford, United Kingdom.); Mr. BOUVIER, S. (SUBATECH, CNRS/IN2P3, IMT Atlantique, Nantes Université, Nantes, France.); Dr. ERONEN, T. (Department of Physics, University of Jyväskylä, Jyväskylä, Finland.); Dr. AGRAMUNT, J. (Instituto de Física Corpuscular (IFIC), València, Spain.); Dr. BELOEUVRE, A. (SUBATECH, CNRS/IN2P3, IMT Atlantique, Nantes Université, Nantes, France.); Dr. BONNET, E. (SUBATECH, CNRS/IN2P3, IMT Atlantique, Nantes Université, Nantes, France.); Dr. ETASSE, D. (LPC Caen, CNRS/IN2P3, Caen, France.); Dr. GIOT, L. (SUBATECH, CNRS/IN2P3, IMT Atlantique, Nantes Université, Nantes, France.); Mr. JARIES, A. (Department of Physics, University of Jyväskylä, Jyväskylä, Finland.); Dr. LAUREAU, A. (SUBATECH, CNRS/IN2P3, IMT Atlantique, Nantes Université, Nantes, France.); Mr. MOLLA, Y. (SUBATECH, CNRS/IN2P3, IMT Atlantique, Nantes Université, Nantes, France.); Dr. PORTA, A. (SUBATECH, CNRS/IN2P3, IMT Atlantique, Nantes Université, Nantes, France.); Dr. TAIN, J. L. (Instituto de Física Corpuscular (IFIC), València, Spain.); Mr. VICTORIA, J. A. (Instituto de Física Corpuscular (IFIC), València, Spain.); THE IGISOL COLLABORATION (Department of Physics, University of Jyväskylä, Jyväskylä, Finland.)

Presenter(s) : Mr. ALCALÁ, G. A. (Instituto de Física Corpuscular (IFIC), València, Spain.)

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