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Beta decay studies for the calculations of the antineutrino spectrum from reactors and applications

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Predicting the antineutrino spectrum from reactors is relevant for a range of applications from the study of neutrino oscillations parameters to non-proliferation. Two methods for reconstructing the antineutrino spectrum have been used in the past: the conversion method [1,2], based on the measurements of Schreckenbach and collaborators [1], the summation method [3,4] or a combination of both [4]. The comparison of the predicted spectrum with the measurements has also led to the so-called reactor anomaly [5], a problem that has attracted considerable attention in recent years.

In this contribution I will present a systematic study of beta decays of the most relevant fission products performed by our collaboration (see for example [6,7,8,9] using the total absorption technique [10,11], that has improved considerably the prediction of the antineutrino spectrum from reactors using the summation method [12].

The measurements have also impact in nuclear structure, astrophysics and practical applications as the calculations of the decay heat from nuclear reactors (see for example [8,11]).

In the contribution I will present the problems faced when calculating the antineutrino spectrum, introduce the technique used in our beta decay studies and provide examples of the studied cases and their impact in different applications.

[1] K. Schreckenbach et al., Phys. Lett. B 99, 251 (1981); K. Schreckenbach et al., Phys. Lett. B 160, 325 (1985); F. von Feilitzsch, A.A. Hahn, K. Schreckenbach, Phys. Lett. B 118, 162 (1982); A.A. Hahn et al., Phys. Lett. B 218, 365 (1989)
[2] P. Huber, Phys. Rev. C 84, 024617 (2011)
[3] T.A. Mueller et al., Phys. Rev. C 83, 054615 (2011)
[4] M. Fallot et al., Phys. Rev. Lett. 109, 202504 (2012);
[5] G. Mention et al., Phys. Rev. D 83, 073006 (2011)
[6] A. Algora et al., Phys. Rev. Lett. 105, 202501 (2010); D. Jordan et al., Phys. Rev. C 87, 044318 (2013).
[7] A. A. Zakari-Issoufou et al., Phys. Rev. Lett. 115, 102503 (2015).
[8] J. L. Tain et al., Phys. Rev. Lett. 115, 062502 (2015); E. Valencia et al., Phys. Rev. C 95, 024320 (2017).
[9] V. Guadilla et al., Phys. Rev. Lett. 122, 042502 (2019)
[10] B. Rubio et al., J. Phys. G Nucl. Part. Phys. 31, S1477 (2005)
[11] A. Algora et al., Eur. Phys. J. A 57 (2021)
[12] M. Estienne et al., Phys. Rev. Lett. 123, 022502 (2019).

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