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On the Best Position for External Calibration Source in Beta-Gamma Coincidence Measurements

Beta-gamma coincidence method is the basis for low-activity radioxenon activity analysis. An important task in an accurate measurement is to precisely calibrate system. Usually it is expensive or even impossible to find a reasonable amount of purified radioxenon gas for calibration purposes. A good alternative is to calibrate using an external gamma-rays source like Cs-137. The main question is where to place the source to have a more accurate calibration measurement. There are several important factors in the simulation of response function, in which radiation and optical simulations have a dominant role. We have developed an improved radio-optical simulation procedure for this purpose to have enough data resulted in external calibration process. The method is to match between radiation transport using MCNP code; and optical scintillation light transport using our home-made code ray-tracing code Optix. Results of the current study shows that there are several factors regarding the calibration source positioning which should be taken into account for every individual configuration/system. The concentration was on our proposed cylindrical well-type coincidence system.

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