

Abstract Submitted
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Radioisotopic Batteries at Various Sizes beyond the Appraised Betavoltaic Cell ERIC STEINFELDS, KEITH ANDREW, Western Kentucky University — There several design concepts for radioisotopic batteries (aka nuclear batteries) besides Radioisotope Thermoelectric Generators (RTGs). In this SESAPS meeting, we shall introduce to physicists the very promising power alternative of a multi-decade radioisotopic battery – to fit at mm and at microscales. We shall introduce the concept of Photon Assisted Radioisotope Energy Source (PARES) and more specifically to a solid state elaboration of PARES. Although RTGs have been constructed and effectively used to power mid-sized space probes for two generations, RTGs suffer from low efficiencies when made compact. An alternative to the RTG for small systems has been betavoltaic cells. A theoretical advantage of a betavoltaic cell over an RTG is that the betavoltaic uses quantum mechanical rather than thermodynamic mechanisms internally. However, in realistic devices we cannot totally escape the consequences of radiative exposure of crystalline components of solid betavoltaic cells (most are solid) by beta particles. One of the solid state PARESEs can be designed to be just as small as a betavoltaic cell, while continuing to perform well in the long term due to thorough and effective addressing of dose issues and appropriate internal shielding.

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