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Hard to measure nuclear decays: Digital spectroscopy of nuclei far from stability

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Discoveries on the fringes of chart of nuclei are largely driven by implementations of new more powerful accelerators, which enable the production of ever more exotic isotopes. However, the detection techniques have to keep up with these developments, because of the additional challenges which are posed by the short lifetimes and often very low production rates. While the rare isotope production and identification capabilities developed in the Holifield Radioactive Ion Beam Facility [1] enabled a number of discoveries on both proton and neutron rich sides of the chart of nuclei, it was often the case, that application of the new instrumentation was a critical factor for success. During more than a decade of use of digital spectroscopy systems at Oak Ridge [1,2,3] a number of important measurements were made. I will present examples of these studies, with a particular focus on the alpha decays near ^{100}Sn [4] and beta-delayed neutron emission near r-process path.

References:
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[4] I.G. Darby et al., Phys. Rev. Lett. 105, 162502 (2010).

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