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Automatic sample positioner for short half life nuclides in neutron activation analysis

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Measurements of short half life nuclides present an interesting challenge. In one hand, sources lose their activity very quickly, allowing only for short measurement times that may undermine measurement statistics; on the other hand, if the source is too active when the measurement starts, pile-up and dead time effects may also spoil the measurement. One approach that may help with this issue is to start the measurement with a larger sample-detector distance, and bring down this distance as the source decays - of course, in comparative Neutron Activation Analysis measurements, the exact same procedure would have to be performed for the comparator. In this work, an automatic sample positioner has been developed that changes the sample-detector distance after the count rate has been reduced below a certain threshold, interacting with the acquisition system in order to produce a separate spectrum for each position; the system also records the positions and times used for the sample in order to repeat the exact same measurement for the comparator. The performance and advantages of such a system were assessed by comparing the results obtained for a sample using this system and the results obtained using a regular single-distance measurement.