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OSIRIS - A Gamma-Ray Spectrometer for CTBT On-Site Inspections

We are designing and testing a new high-resolution gamma-ray spectrometer for on-site inspections under the Comprehensive Nuclear-Test-Ban Treaty: the On-Site Inspection RadioIsotopic Spectrometer—OSIRIS. The instrument provides robust protection for the potentially sensitive aspects of measured gamma-ray spectra, revealing only gamma-ray peak data for selected radioisotopes. We will evaluate the approach across gamma spectrum compositions for CTBT treaty-compliant and non-compliant scenarios. The OSIRIS hardware includes an ORTEC Trans-SPEC-DX-100T mechanically-cooled HPGe detector, requiring no liquid nitrogen, and a digital signal-processing multichannel analyzer1. Detector relative efficiency and energy resolution at 1332 keV are 40% and 2.1 keV, respectively. A ruggedized Panasonic notebook computer serves as the OSIRIS control panel and readout. A single external battery will operate the OSIRIS detector for 12 hours, swappable for longer operation. OSIRIS uses GAUSS nonlinear least-squares spectrum analysis software2 to process the spectra, and it can be energy-calibrated using natural background radiation. The energy spectra are not visible to the user; instead, the displayed information is limited to radioisotopes relevant to CTBT on-site inspections. By design, OSIRIS spectral data cannot be saved, and the collected spectra are erased from memory at shutdown. References 1. http://www.ortec-online.com/Solutions/gamma-spectroscopy.aspx 2. R.G.Helmer, M.H.Putnam, and C.M.McCullagh, Nuclear Instruments and Methods A242(1986)427.

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