

Indications of High-Purity Germanium Detector Failure

The CTBTO aims to maximize the data availability and spectral quality from its radionuclide network. The radionuclide network consists of numerous stations of which many are in remote locations. In order to achieve the goal it is important to exploit possibilities to predict failures of the gamma detectors. The high resolution gamma detection requires reliable cooling and good cryostat vacuum. PTS staff are developing ways to monitor these and will present some exemplary cases in this presentation.

The electrical cooling system manufactured by Canberra, CP5 and CP5+, is operated in a mode which keeps the detector temperature at a constant level. When the detector vacuum deteriorates more power is needed to maintain the same crystal temperature. Therefore the cooling power consumption is a very good benchmark for an adequate detector vacuum and should be included in the State of Health parameters. By monitoring the full width at half maximum and observing a steady increase over time one can infer deteriorated detector vacuum.

On the other hand ORTEC X-Cooler II and X-Cooler III are operated by supplying constant power. When the vacuum deteriorates the Cooler cannot absorb the higher load which leads to an increase in crystal temperature and detector resolution.

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