

Radon Progeny Monitoring Outdoors Using Multiple NaI Detectors

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Monitoring of radon progeny concentration in atmospheric aerosol offers valuable insight into various environmental processes such as air masses transfer, aerosol residence times and seismic activity. However, measuring the atmospheric concentration of radon progeny in real time may prove challenging, mainly due to their relatively short half-lives. A gamma-spectroscopy technique utilizing a 3x3 NaI(Tl) detector measuring radon progeny collected on an air-filter during air sampling has been developed and is being applied at the Nuclear Engineering Laboratory of the National Technical University of Athens [1]. In this work, the measuring technique is upgraded by introducing another 2x2 NaI(Tl) detector for the monitoring of short-lived radon progeny in the surroundings of the measurement site. Radon progeny attached to sampled aerosol are measured with the NaI 3x3 detector, considered as the primary detector, while the gamma background near the primary detector, which is substantially higher during precipitation events, is measured with the NaI 2x2 detector. The combination of the signals from the two detectors improves the monitoring of radon progeny variations in atmospheric aerosol, filtering the rain-induced signals and yielding more reliable measurements which will hopefully contribute to a better understanding of radon progeny fluctuations in the lower tropospheric air.

[1] Kanoutos, K., Petropoulos, N.P., & Anagnostakis, M.J. (2024). *Continuous Measurement of Radon Progeny in Atmospheric Aerosol Using a NaI(Tl) Detector and a High Volume Air Sampler*. Poster presented at: Applied Nuclear Physics Conference (ANP 2024), 23-27 September 2024, Thessaloniki, Greece.