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YSCMR 2025

Proceedings of the

YOUNG SCIENTISTS' CONFERENCE ON MULTIDISCIPLINARY RESEARCH

VIRTUAL INTERNATIONAL CONFERENCE

2025

ISSN 2815-0260
Proceedings of the Young Scientists' Conference on Multidisciplinary Research-2025
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
27th November 2025

Paper ID: CMT_186

Assessment of background radiation levels in collegiate science classes: a case study, Kandy, Sri Lanka

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Background radiation is an integral part of the natural environment, existing in both ionizing and non-ionizing forms, which can originate from natural or man-made processes. The levels of background radiation vary spatially and temporally, necessitating monitoring to enhance societal safety as few negative case studies recorded. This study assessed the levels of ionizing and non-ionizing background radiation in a school in Kandy, which offers collegiate science classes with scientific laboratories. The data will record as a base value for the collegiate science classes. A preliminary measurement was conducted on September 24, 2024, covering the school's science classes (9) and laboratories (3), with an outside location as a reference. Selected bands of the radio spectrum were measured using a spectrum analyzer, a Geiger counter was utilized to gauge ionizing radiation levels, adhering to standard measurement protocols. The background radiation levels for ionizing radiation ranged from 0.01 mR/hr (0.878 mS/yr) to 0.02 mR/hr (1.752 mS/yr) across the measured locations, including laboratories and classrooms for science students. These levels are below the global average ionizing radiation exposure of 2.4 mS/yr, as reported by the International Commission on Radiological Protection (ICRP), which accounts for natural radiation from terrestrial sources and cosmic rays. Furthermore, the measured maximum radio frequency bandwidths for Industrial, Scientific and Medical applications (ISM), Global System for Mobile communication (GSM 900, GSM 1800), Wireless Local Area Network for Wi-Fi facilities (WLAN), and Long Term Evolution network for 4G and 5G (LTE 26) were 0.000004, 0.00763, 0.00152, 0.000241, and 0.000304 $\mu W/cm^2$, respectively. These values are significantly below the national standard of 10 $\mu W/cm^2$ established by the Telecommunications Regulatory Commission, following the guidelines of the International Commission on Non-Ionizing Radiation Protection (ICNIRP). Therefore, the results indicate no hazardous levels of background radiation in the school's science environments, which include physics, chemistry, and biology laboratories.

Keywords: *Geiger counter, spectrum analyser, radiation measurements, Kandy*