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RockyRAD: a hands-on kit for exploring rock radioactivity

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RockyRAD represents an evolution of the traditional Geiger counter, transforming it into a complete and innovative educational tool. This compact and portable device is part of a kit containing rock samples, selected for their varying levels of natural radioactivity. These samples allow students to investigate the radioactivity of rocks, understanding how it is influenced by internal factors such as chemical composition, rather than external characteristics such as color or texture.

Students can compare the radiation levels of igneous and sedimentary rocks, assess the effectiveness of shielding materials, or conduct long-term background radiation measurements. This hands-on approach provides a deeper understanding of the radioactivity originating from natural radioisotopes (e.g., U-238) and their decay products as well as the interactions between radiation and matter.

Through an Android app, users can share results, export data for analysis, and plan extended experiments, making it suitable for citizen science. Students can evaluate reliability, calculate uncertainties, and observe how these change with measurement time, linking experimental observations to theoretical principles. The device provides both counts per minute (CPM) and equivalent dose rate (nSv/h), facilitating the understanding of absorbed dose concepts.

Teachers can design experiments tailored to school curricula, fostering an interdisciplinary approach that integrates physics, Earth science, and statistics.

In today's energy landscape, where nuclear power is regaining attention, RockyRAD promotes scientific inquiry and awareness. By studying rock radioactivity, students develop a deeper understanding of environmental radiation, supporting informed perspectives on nuclear energy and other energy choices.