Particle Physics: Does Altitude Affect the Quantity of Background Radiation?

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Background radiation is the collective term for highly ionized particles and waves that are present in the environment. The amount of background radiation that reaches the Earth's surface varies as its energy is effectively absorbed by the atmosphere. A cloud chamber is able to detect background radiation as it interacts with supersaturated alcohol vapor, created by a temperature difference between the top and bottom of the chamber (the base is cooled with dry ice and the top is heated by a hot water bottle) and ionizes it. The ions act as condensation nuclei and around that, a mist will form, and a trail will be left. A cloud chamber was constructed using household items to make observations of background radiation at three different altitudes (S1:464 meters, S2:280 meters and S3:64 meters) at Mount Keira, Wollongong. Results indicate there was a significant ($p<0.05$) difference in background radiation among altitudes and a significant ($p<0.05$) difference among the background radiation types measured. There was a higher level of background radiation detected at higher altitudes because there were less air molecules to interact with meaning that at higher altitudes, the particles would have more energy making them more detectable by the cloud chamber. Therefore, altitude does significantly affect the amount of background radiation detected by the cloud chamber as it was determined that radiation is proportional to altitude.