

Effect of water vapour on neutron detection of cosmic rays

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Cosmic rays play an important role in our daily lives and can be used in various fields of educational research, especially in physics and astrophysics. However, the detection of cosmic rays is affected by many factors, and atmospheric water vapour pressure was recently suspected to be an important factor. Princess Sirindhorn Neutron Monitor (PSNM) is a cosmic ray detector in Chiangmai, and the count rate of nearby bare counters relative to PSNM showed a strong anti-correlation with atmospheric water vapour pressure data. It is not clear whether this anti-correlation is a direct effect of water vapour or an indirect effect due to water accumulation on concrete around PSNM. Such an anti-correlation was, therefore, searched with the count rate from a bare neutron counter (MicroMonitor) at Mahidol University in Bangkok. MicroMonitor is in a building; the indirect effect should not be found, but a direct effect would be. Raw count rate and atmospheric pressure data from several years of MicroMonitor operation were processed, normalised with the pressure-corrected PSNM count rate and searched for a correlation with atmospheric water vapour pressure data at Bangkok. The results were compared with those for PSNM. The neutron detection data at Mahidol University were found that they fluctuate much less and do not exhibit a direct effect of atmospheric water vapour. Consequently, it was concluded that the neutrons detected by bare counters can be indirectly affected by atmospheric water vapour as a proxy for accumulated water which absorbs low energy neutrons.

Summary

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