



Development of a Boron-lined Cosmic Neutron Detector for Mobile Measurements

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During the past years an interdisciplinary community of scientists has established a non-invasive soil moisture measurement technique using secondary cosmic ray neutrons. The method is based on the characteristic of hydrogen to effectively moderate neutrons. Consequently the amount of reflected fast neutrons strongly depends on the water content of the soil. The method has proven to be capable of closing the gap in spatial resolution between satellite and point-like measurements by providing a footprint of several hectares, which makes it a promising candidate for multiple applications in environmental science.

Neutron detection systems involve materials that convert weakly interacting neutrons into ionizing particles. For a long time such have relied on Helium-3 as an efficient agent with a high absorption cross-section. Its current scarcity demands for technological solutions with other converters. In Heidelberg a boron-10-lined detector has been designed offering lower costs at good detection rates. It is also the onset for a mobile detection system which allows for measurements on larger scales at otherwise inaccessible terrain. The talk will cover measurement results and comparisons to recent Monte-Carlo simulations.