

# Cosmic Ray Neutron Sensor (CRNS) technology for area-wide soil moisture monitoring



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**13 December 2021  
at 15:00 CET**

Information and Registration:  
<http://indico.ictp.it/event/9753/>

Global climate change has a major impact on the availability of water resources for agricultural production. Sustainable agricultural productivity to ensure food security requires good agricultural water management. To improve the use of this resource in agriculture, it is imperative to monitor the soil moisture, which is not only a key variable in irrigation management, but also for hydrological modelling, ground water recharge, flood, and drought forecasting.

Cosmic Ray Neutron Sensors (CRNS) is a nuclear technology which have the capability to estimate field-scale soil moisture (SM) in large areas up to 20 to 30 ha and appear to become a credible and robust alternative to traditional soil moisture monitoring devices.

CRNS technique is based on the detection of natural neutron coming from cosmos. The fast, high-energy incoming neutrons eventually penetrate the soil and then scatter back into the atmosphere. These scattered neutrons lose energy ('thermalized') due to collisions mainly with hydrogen atoms which come mostly from soil moisture. The CRNS measures these low-energy neutrons near the soil surface. Because the neutrons are spatially distributed and scatter across large distances in the air, they can monitor soil moisture over vast areas.

CRNS technology is a promising tool for area-wide soil moisture monitoring and agricultural water management.

**A virtual seminar organized by Science,  
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