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## Smart Scintillating Neutron Detectors for Soil Moisture Monitoring

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Cosmic ray neutron sensing has been shown to be a powerful method for continuously monitoring soil moisture over large areas. This technique relies on the detection of albedo cosmic ray neutrons coming from the soil to infer the local hydrogen content. Cosmic ray neutron sensing is well-suited for hydrological monitoring in the field sizes typically seen on smallholder farms. The ongoing development of new lower-cost neutron detector instrumentation and processing tools will help to further support the adoption of this novel technique within the agricultural industry.

In this presentation I will discuss recent efforts at Durham University (UK) to develop low-cost cosmic ray neutron detectors to support soil moisture monitoring in the agriculture sector. These systems rely on lithium and boron-based scintillator foils for thermal neutron detection. Recent pilot studies in collaboration with the COSMOS-UK network have shown that the detected neutron rate in these sensors correlates well with results obtained from traditional gaseous systems. Work is now underway to improve the robustness of these scintillator systems for use in agricultural and civil engineering applications.

In addition, I will present a new international research network, COSMIC-SWAMP, which is looking at the integration of cosmic ray neutron sensors with managed irrigation sites in Brazil. By combining low-cost neutron probes with a smart water management platform (SWAMP), this research network is looking at using cosmic ray neutrons to perform data-driven irrigation control over large areas. The instrumentation being considered for COSMIC-SWAMP will be presented before discussing the future plans for the network.

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