Abstract Submitted
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**Instrumentation Development for Plant Research at the Triangle Universities Nuclear Laboratory**[1] NATHAN TRIPP, Grand Valley State University, CALVIN HOWELL, ALEX CROWELL, Triangle Universities Nuclear Laboratory, Duke University Physics Department, CHANTAL REID, Duke University Biology Department, DREW WEISENBERGER, Jefferson Lab Radiation Detector & Imaging Group, TUNL CARBON-11 GROUP COLLABORATION — Plant physiology studies at TUNL use a variety of short-lived isotopes in radiotracing measurements. Two recently developed capabilities for this research are production of nitrogen-13 (N-13) in a water target and pulsed-loading of carbon-11 (C-11). Administering N-13 as a solution of aqueous nitrate ions allows researchers to observe plant uptake of nitrogen through the roots. The nitrogen tracer is produced through proton bombardment of a natural water target. Two main species of isotopes form during irradiation: the desired N-13 and a fluorine-18 (F-18) contaminant. A scrubber containing alumina pellets reduces the F-18 contamination by about an order of magnitude. C-11 administered as gaseous carbon dioxide allows researchers to observe plant uptake of carbon from the atmosphere. A system was constructed to deliver C-11 tagged air in bursts of adjustable width. The radioactive signatures of such pulses have sharp leading and trailing edges. This differs from the usual loading technique where the gradual exponential decay of C-11 dominates the trailing edge. This poster will include descriptions of the C-11 pulsing and N-13 production systems, their technical performance, and demonstrations of their use in plant physiology research at TUNL.

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Nathan Tripp
Grand Valley State University

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