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Neutron background characterization of deep underground laboratories[1] ANDREAS BEST, JOACHIM GÖRRES, ALEX LONG, KARL SMITH, ED STECH, MICHAEL WIESCHER, University of Notre Dame, DIANA COLLABORATION — Low-energy (α, n) reactions in stellar helium and carbon burning provide the neutrons for the formation of elements beyond iron by the slow neutron capture process. The very low cross sections at stellar energies necessitate the use of high-efficiency detectors as well as measuring in a very low neutron background environment. By going deep underground the neutron flux can be reduced by orders of magnitude compared to surface levels, enabling the measurement of reactions for nuclear astrophysics at previously inaccessible energies. The remaining neutron flux is mostly due to spontaneous fission of ^{238}U in the cavity walls and (α, n) reactions induced by α-particles from the natural radioactivity of the underground environment. Using a portable setup consisting of 4 ^{3}He counters and polyethylene moderators the DIANA collaboration is conducting neutron background measurements at various deep underground laboratories in the US. We present first results from the Kimballton Underground Research Facility, the Soudan Underground Laboratory and the 4100 feet level of the Sanford Undeground Research Facility (SURF). Measurements at other depths in SURF and at the Waste Isolation Pilot Plant are in planning.

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