

**WS101-10: Recent developments and future applications for
Laser-Driven Neutron Sources**

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One of the pressing demands in our western society is the safety and maintenance of our nuclear legacy. In Germany the dismantling, safe processing and storage of nuclear waste have resulted in a multi-national research program. One of the findings was that nondestructive testing methods and material selective imaging of compound large objects is possible using thermal and fast neutrons. They also identified that a powerful, safe, and compact neutron source would be required.

Since the advent of ultra-intense lasers many applications have been investigated using the unique parameter of laser-driven secondary sources. Recently, we have demonstrated the realization of a short-pulse laser-driven neutron source with beam intensities orders of magnitude above earlier attempts. Those sources can lead to a compact and potentially mobile neutron source with a large number of applications.

I will present the underlying mechanism of creating an intense pulsed and highly directed beam of neutrons using ultra-intense lasers and the recent experimental results using laser systems in the US and in Europe. Furthermore, I will focus on a few examples of using such sources for applications that are either important for the security of our countries or will have large economical potential in industrial applications. These range from the remote sensing of illicit nuclear material in cargo to the non-destructive analysis of large civil constructions using compact laser systems.