



Adelphi Technology Inc.

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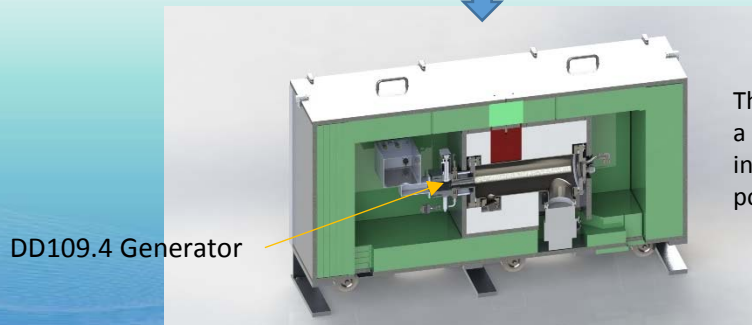
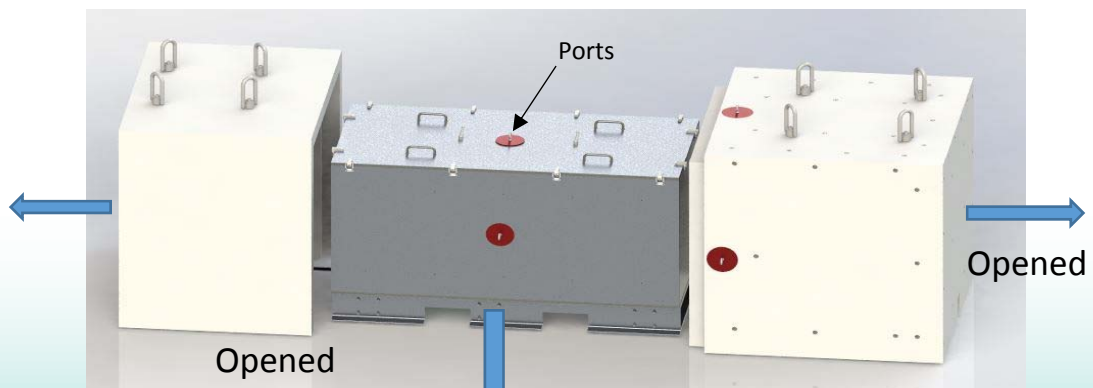
Moderated and Shielded Neutron Generators for Safe Laboratory Use *Thermal neutrons for Material Analysis*

Adelphi Technology combines a compact, high yield fast-neutron generator with a polyethylene moderator that quickly thermalizes fast neutrons into high thermal fluxes. Outside the moderator are layers of shielding to minimize spurious neutron and gamma ray emissions so that the dosage is reduced to public access levels.

Three or more ports are available for placing materials for neutron activation analysis (NAA) of their elemental constituency. One of the ports can be used for fast neutron emission. Virtually any of Adelphi's standard model generators can be placed in various combinations of shielding and moderation to match the customer's needs.



These moderated neutron generators are revolutionary in that they produce thermal fluxes that are approaching those obtained from research reactors and national neutron facilities, thus opening up to small laboratories the possibility of applications heretofore reserved for the larger, more expensive facilities. These generators are well suited to materials analysis, radiography, and the teaching of nuclear physics.



The source's inner core composed of a model DD109.4 generator enclosed in a moderator and borated polyethylene & lead shielding

Uses

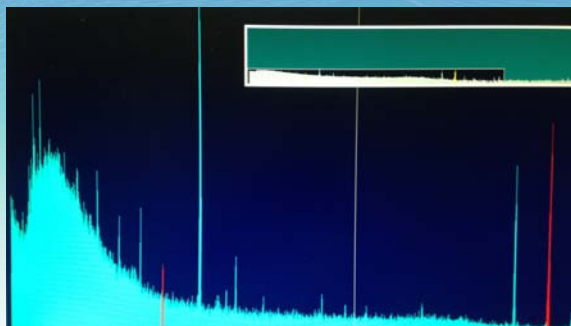


Image of the delayed gamma ray spectrum from an activated soil sample

Teaching Nuclear Physics

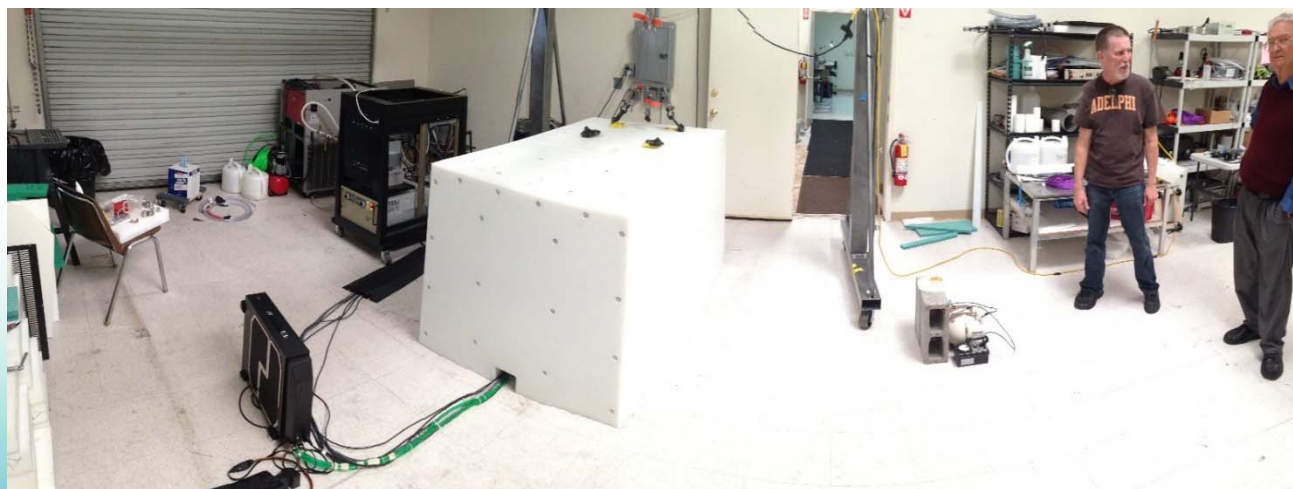
Imagine having a safe, compact nuclear reactor for classroom demonstrations, experiments and research. Unlike a reactor, these are not the size of a large two story building, do not cost millions of dollars, do not require special government licensing or uranium fuel and do not produce radioactive waste by-products. In these generators, the only 'fuel' used is deuterium, readily available from most scientific gas suppliers. These deuterium based generators require no licensing for either export or operation. Shielding can be purchased that fits precisely around the generator and is removable to allow access to the experimental sample chamber.

Materials Identification

Moderating to thermal energies permits activation of many isotopes and makes the generator useful for materials analysis and identification. The generator has a high thermal neutron flux and so is a good source for Neutron Activation Analysis (NAA) and Prompt Gamma Neutron Activation Analysis (PGNAA). This moderated source closely mimics experimental research reactors, which have previously been the primary sources of thermal neutrons that can be used for NAA and PGNAA. Furthermore, the source can be pulsed or gated to minimize the noise background. This can be helpful for delayed neutron activation analysis.

DD109.4M Specifications with moderator and shielding

| | |
|--------------------------|---|
| Fast Neutron Yield | 4×10^9 neutrons/sec |
| Thermal Flux | 1×10^7 neutrons/cm ² /sec |
| Neutron Energy | Thermalized from 2.5 MeV |
| Scheduled maintenance | ≥ 2000 hours |
| Standard operating mode | Continuous |
| Pulse on demand (option) | $\geq 100 \mu\text{S}$, to 100% duty factor |
| Dose 1 m from shielding | $< 25 \mu\text{Sv/hr}$. |



The DD109.4M is a high output laboratory source that is safe to operate yet powerful enough to easily perform activation measurements.



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