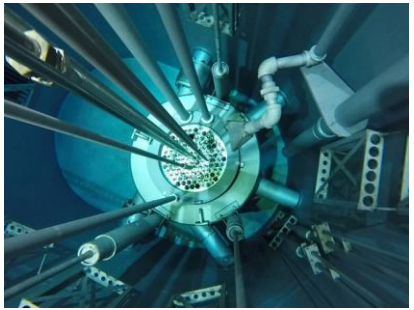
On-Line Radiation Protection Training at a University Research Reactor



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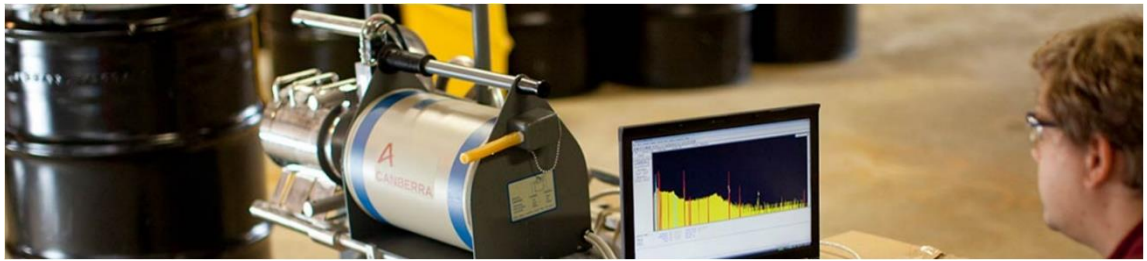
Radiation Protection Educational Challenges



https://www.orau.org/health-physics/index.html

Nuclear and Radiation Engineering at UT-Austin

Vision

- A nationally and internationally recognized program that promotes
  - basic & applied research and training/education in nuclear science and engineering and
  - technology development to support the nation's critical mission needs

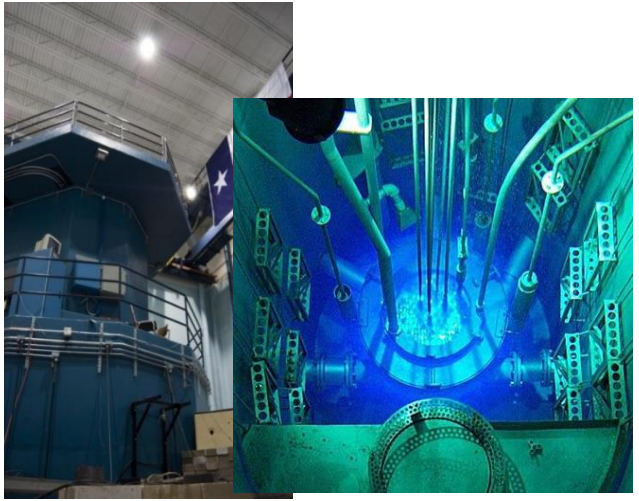
Mission

- Educate the next generation of leaders in nuclear science and engineering
- Conduct leading research at the forefront of the international nuclear community
- Apply nuclear technology for solving multidisciplinary problems
- Provide service to the citizens of Texas, the U.S., and the international community

Facilities

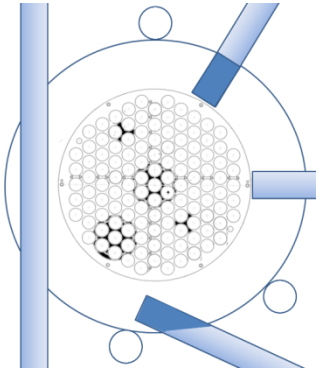
Radiation Sources

- 1.1 MW TRIGA Nuclear Reactor
- Thermo MP320 14-MeV Neutron Generator ($1x10^8$ n/s with a Pulse Rate up to 20 kHz)
- Neutron, α, β, and γ radiation sources



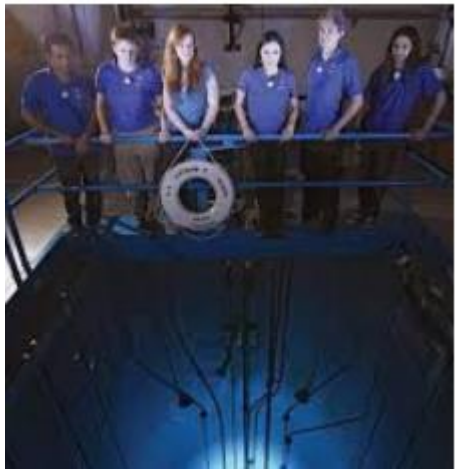
Beam Port Facilities

- Neutron Radiography
- Neutron Depth Profiling
- Prompt-Gamma Activation Analysis
- Fast Neutron Facility

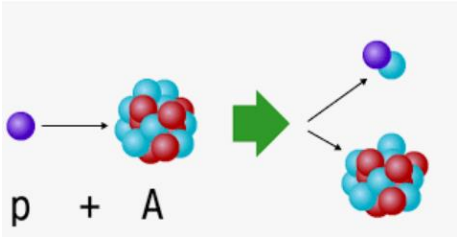


- Radiation protection at research reactors encompasses a much wider scope of training requirements than usually seen at nuclear power plants, accelerators, or other industrial settings.

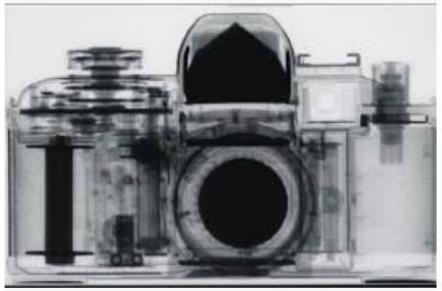
- There is a wide difference of experience in users such as students who begin in their first year compared to researchers more advanced in their careers.



- Research reactors can offer a wide range of experimental facilities that can produce an array of isotopes of differing beta and gamma-ray strength to be used for medical applications, nuclear forensics and industrial research, neutron and prompt gamma activation analysis, radiochemistry, neutron radiography, nuclear instrumentation development and radiation damage studies.

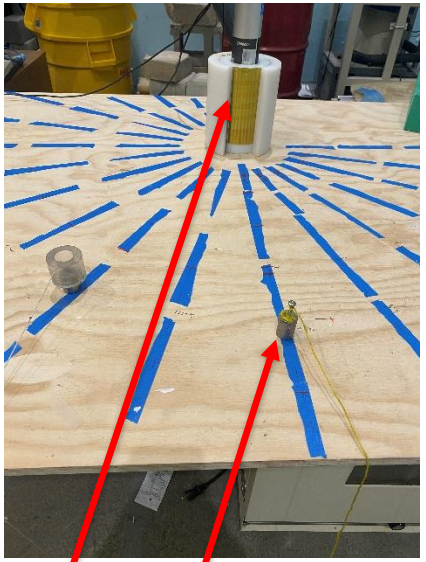


- Includes subcritical facility, tens of kW to tens of MW of research reactors, neutron sources such as Pu(Be), DD (2 MeV) and DT (14 MeV) neutron generators



Prompt Gamma

Neutron Irradiated Electronics



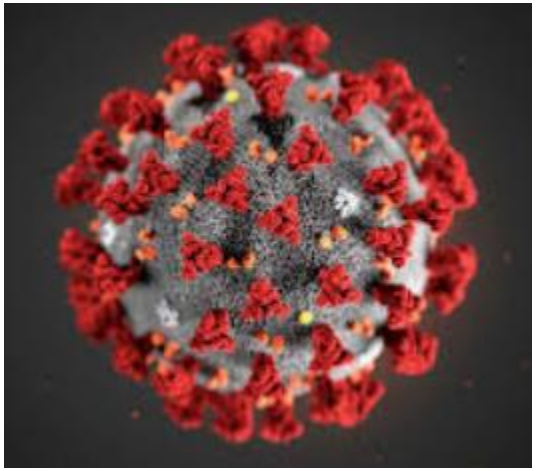
Pu(Be) and Neutron Detector

NAA Irradiation Station

Nuclear Engineering Teaching Lab On-Line Training

- Hazard Communication, Laboratory Safety, Hazardous Waste Management, Radiation Safety, Portable Fire Extinguisher Basics, and Information Security Awareness with periodic refresher courses.

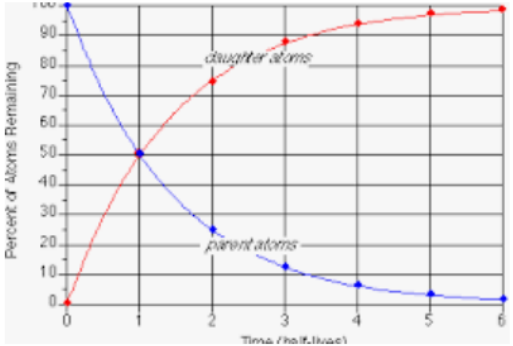
- With the advent of COVID-19 and the requirement that no students attend in-person classes, the NETL on-line laboratories were beta-tested for the first time in the summer of 2020 for an undergraduate/graduate course in Nuclear Forensics with very good success.

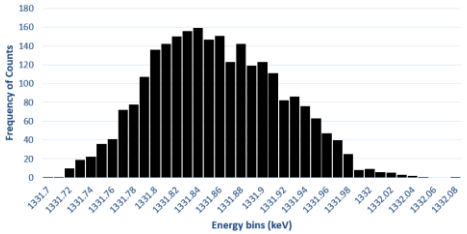


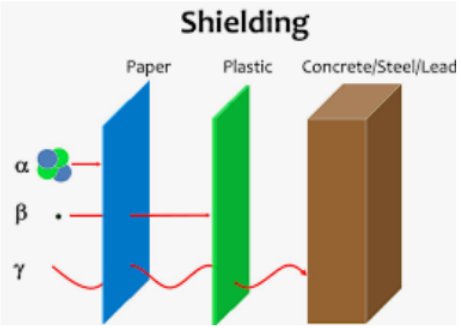
- Videos of experimental set-ups from smart phones were made and distributed with the data to be analyzed by the student.

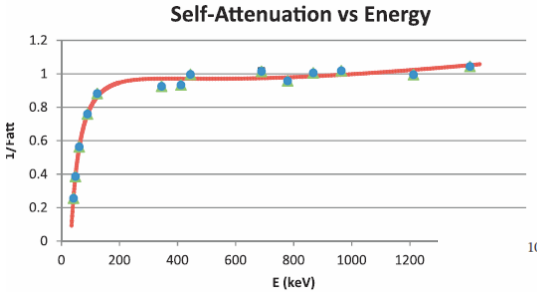
- These experiments included half-life and in-growth measurements, shielding, counting statistics, gamma-ray self-attenuation, and fission product identification.

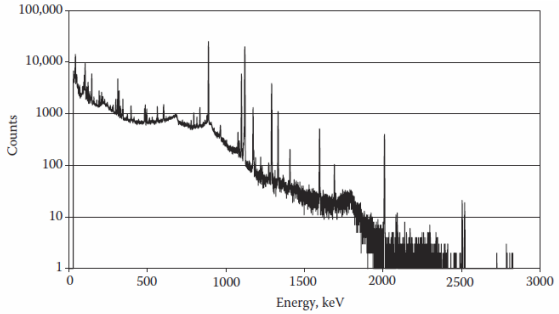
- Two of these laboratories half-life measurements and in-growth, and shielding were then given to the undergraduate/graduate course in Nuclear Environmental Protection in fall 2020.











Conclusion

- On-line health physics and academic laboratory training is now fully integrated into beginning and advanced researchers, and undergraduate and graduate academic courses
- More sophistication in video presentations with animated features is planned for the future