

## **A Deep Underground Science and Engineering Laboratory (DUSEL) at Kimballton, Virginia**

The Kimballton DUSEL site in SW Virginia offers unprecedented opportunities to conduct a broad range of research in many fields. The Kimballton site is hosted by sedimentary rocks, which cover about 3/4 of the earth's land surface. About 90% of the earth's groundwater is currently being produced from sedimentary rocks. Nearly all (99+%) of the world's hydrocarbon resources are hosted in sedimentary rocks, as well as 85% of underground mines. Sedimentary rocks and deep aquifers in sedimentary basins also constitute important reservoirs for carbon storage to address climate change issues that threaten the global economy.

Kimballton can provide the depth (shielding) and cavern size requirements of the physics community whose goals include understanding the origins and evolution of the Universe. At the same time, the geological characteristics of the Kimballton site are ideally suited for geoscience and engineering research related to issues of societal relevance, including water resources, climate change, carbon management, development of underground space, and the origin and exploration for hydrocarbon and other energy resources. Sedimentary rocks (and their contained fossil aquifers) that have been isolated from the earth's surface for 100's of millions of years similarly provide opportunities to study the limits of life on earth and survivability of life in extreme environments.

The Kimballton science team includes over 60 internationally recognized experts in fields such as rock mechanics and underground construction, uncertainty and risk analysis/assessment, environmental assessment, public relations and consensus building, education and outreach, and management of major projects. These are in addition to the more research oriented fields of Physics, Geoscience, Engineering and Biology. Overall, there are some 150+ scientists, staff and administrators involved.

The conceptual design being developed for Kimballton DUSEL includes education and outreach (E&O) components that build upon successful local (e.g., VT Mobile Chemistry Laboratory) and national (e.g., NSF Earth Scope) programs, as well as E&O documents developed through the NUSL, NeSS and EarthLab workshops. Kimballton DUSEL provides an excellent opportunity to build Science, Technology, Engineering, and Math (STEM) literacy for the public, K-16 students and teachers, local communities and other stakeholders as they learn how DUSEL projects are exploring the universe and our earth. Kimballton is an ideal location for such efforts because it is rural, while still offering accessibility to broad audiences through existing transportation and technology corridors: Kimballton is within a day's drive for 50% of the U.S. population.

The project will increase the broad recognition of Southern Appalachia as a place engaged in big science, complementing existing research centers such as the Marshall Space Flight Center (NASA), Huntsville, AL; Oak Ridge National Laboratory (DOE), Oak Ridge, TN; the University of Tennessee-Knoxville; the National Radio Astronomy Observatory (NSF); Green Bank, WV; and Virginia Tech. These and future initiatives represent a change from an economic base built upon the mineral extractive industries historically associated with the region, to a new, sustainable, economy based on science and technology. Professionals with broad experience in national and international E&O, as well as local involvement in grass roots programs within the southern Appalachian region, will lead this effort.