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Session 4: Impact: wider applications of neutrino science

Neutrino geology

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Sensors served in the past as essential drivers of Economic Development. As example seismic methods support both exploratory geology and mining. Seismic methods and tomographic processes and algorithms provided both support for mining explorations and nuclear explosion detection. Both these had a major economic and security impact.

We are proposing a set of sensing, readout and presentation methods for identifying sources of geo-neutrinos. Our novel approach is based on coherent scattering on nuclei and is enabled by progress in nanotechnology and molecular biology. Neutrino geology or more technically neutrino emission tomography of upper crust will be synergistic and may replace previous methods and usher a new era in all areas of mining exploration and utilization. The same class of detectors will enable direct detection of dark matter.

We proposed a five year project to develop and deploy directional sensors for detection of sources of geo-neutrinos. No such detectors exist today but all necessary components are available. In this talk we will first describe the state of the art in geo-neutrino detection and then describe what our directional sensors are, and what they can accomplish. For brevity, we shall describe the project in the framework of exploration for essential metals and minerals.