Department of Physics is pleased to announce special lecture series by Dr. Manfred Fink,

Professor of Physics at The University of Texas at Austin and Professor Adjunct at Michigan Tech University

Tuesday, April 1 1:05 pm Fisher 327B:

``Detection of Ultra High Energy Cosmic Neutrinos in a Salt-dome''

I will present feasibility studies using the unique properties of salt domes to collect data from ultra high-energy neutrinos ($\approx 10^{20}$eV). Salt domes grew during 150 million years from the Louann Salt in a monolithic, polycrystalline structure. Most domes are 6 km deep and have diameters of 1-10 km.. There are several properties the salt domes have to possess to quantify them as high quality detectors. We need to know the mean free path of electromagnetic radiation and ultrasound in the polycrystalline material, the intrinsic stability of the salt at great depths, the radioactive backgrounds and those introduced by impurities in the surrounding rock and the flux of cosmic high-energy neutrinos. A salt dome detector will be a more sensitive second generation ultra high-energy neutrino detector than the Ice-Cube project at the South Pole

Wednesday, April 2 1:05 pm Fisher 131:

``Raman Spectroscopy at the bottom of the deep-ocean''

Raman spectroscopy is becoming the prevalently applied spectroscopic tool in science, technology and medicine for the following reasons: (1) the spectra are very simple (scarce line density) and thus free of interferences, (2) the lasers needed are small, highly efficient, and affordable. Historically, investigation in the deep ocean relied on sampling by the remote submarines and laboratory analysis. I will describe a novel Raman spectrometer capable of operating at several miles depth near the ocean floor. The Raman spectra of methane, carbon dioxide and $CaCO_3$ obtained *in situ* will allow the determination of unaltered state of composition of the bottom of the ocean.

Thursday, April 3 1:05 pm Fisher 327B:

``World's most intense positron source''

Positron annihilation spectroscopy is a well established research tool to characterize the surface and bulk electron distributions of any chosen material. However, the impressive results obtained with this technique have not yielded positron investigations and monitoring on everyday basis. The greatest hindrance is the lack of sufficiently intense positron sources to record a simple . Most positron spectrometers are equipped with radioactive sources which produce at best only modest intensities of 10^6 e^+/s. An improvement by at least a factor of at least 100 is needed to become viable for on-line positron metrology. We propose to use standard technologies to generate an e+ beam with good electron optical properties, such as a small diverging angle, a small diameter and with a flux of 10^8 e^+/s. The positron will be used to research the new dielectrics in MOSFETs with HfO_2 doping and to studies of micro-voids in plastic membranes, which are used in industry to separate gases mixtures