Abstract
Traditionally, the region of the spectrum between 100 gigahertz and 10 terahertz (corresponding to the wavelength range 30 microns – 3 mm) has been among the least explored, due in part to the difficulties associated with efficient generation and detection schemes. However, the recent development of a number of new experimental techniques has sparked a growing interest in the use of terahertz radiation for imaging, spectroscopy, and a variety of commercial applications. This talk presents an overview of this rapidly developing field, and a description of a few of the unique imaging capabilities of the “T-ray” imaging system. For example, by combining interferometry with the coherent detection capability of time-domain spectroscopy, it is possible to form time-of-flight images with a depth resolution well below the limit imposed by the coherence length of the radiation. The use of broadband radiation for imaging also requires a rethinking of such concepts as the Fresnel zone, which is typically defined only at a single frequency. Such considerations have a bearing on the lateral resolution in a tomographic image, and have implications in fields as diverse as biomedical imaging and geophysical prospecting.

Biography
Dr. Mittleman received his B.S. from the Massachusetts Institute of Technology in 1988, and his Ph.D. in 1994 from the University of California Berkeley, both in physics. After two years as a post-doctoral researcher at Bell Laboratories, he joined the Electrical and Computer Engineering Department at Rice University in 1996. His current research involves imaging and sensing with terahertz radiation, with a particular focus on the use of terahertz pulses to study light scattering and photon diffusion. In 2003-2004, Dr. Mittleman is serving his second term as a Distinguished Lecturer for the IEEE Lasers and Electro-Optics Society.