NEER FY 2001 PROJECT ABSTRACT	
Grant Number:	01ID14110
Project Title:	Development of a Novel Tunable X-Ray Source for the RPI-Linac
Lead PI:	Yaron Danon, Rensselaer Polytechnic Institute
Abstract:	We would like to explore the possibility of constructing an intense X-ray source that could be generated from a moderate energy electron beam, such as the beam produced at the RPI LINAC (Ee<100 MeV). The radiation emitted, known in the literature as parametric x-rays (PXR), is generated by passing an electron beam trough a crystal. This mechanism is reported to be most efficient in terms of the number of emitted photons per electron. The quasi-monochromatic X-rays produced, can be used in several research domains for example; thin-film analysis, nanomaterials characterization and semiconductor manufacturing. We are particularly interested in utilizing PXR for phase imaging which offers orders of magnitude improvement in sensitivity to density changes in the imaged sample. This offers a great potential in improving imaging techniques such as mammography. PXR has several properties that make the source attractive for such application. The X-ray energy is quasi-monochromatic and tunable. The energy distribution is very small (<0.1 %) and the radiation is emitted with a very small angular distribution. Our research will include experimental work with several proposed target crystals aiming at the final goal of building a target that will maximize photon yield possible with the RPI LINAC while still maintaining small energy and angular distributions.