FERMILAB-PROPOSAL-0901 901

Fermilab
P.O. Box 500 Batavia, Illinois 60510

November 14, 1997

To: Taiji Yamanouchi

From: Gerry Jackson Gerry Jackson

Re: **Submittal of FNAL Experiment Summary**

As we discussed in your office yesterday, the Recycler medium energy electron cooling experiment, presently envisioned to be performed at the Wiedband Photon Lab (WPL) experimental pit, is asking to be formalized as an official FNAL experiment. With the submittal of the attached experiment summary, I am asking for assignment of an E-number. This action is in compliance with a verbal request of FNAL director John Peoples.

If there is anything that I can provide to assist you in formalizing the WPL electron cooling effort, please feel free to contact me. Thank You for your attention in this matter.

Fermilab
P.O. Box 500 Batavia, Illinois 60510

November 14, 1997

Recycler Medium Energy Electron Cooling Experiment

Spokesperson: Gerald P. Jackson
FNAL BD/MID
gpj@fnal.gov

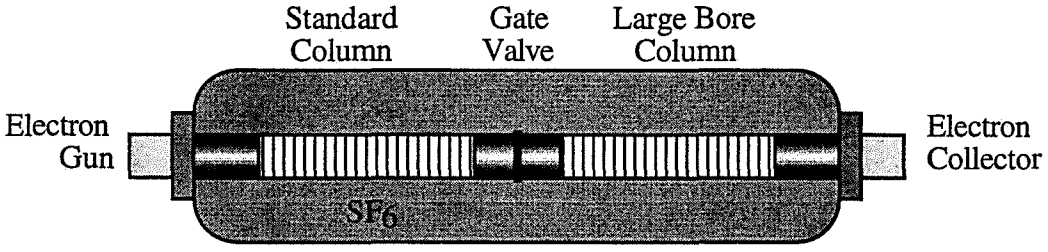
Associate Spokespersons: Sergei Nagaitsev, Electrostatic Accelerators
FNAL BD/HQ
nsergei@fnal.gov

Arden A. Warner, Modified Betatron
FNAL BD/HQ
warner@fnal.gov

Patrick G. Hurh, Technical Support
FNAL BD/MSD
hurh@fnal.gov

The purpose of this experiment is to study the technical issues surrounding the implementation of electron cooling in the Recycler. There are two 5 MeV kinetic energy electron accelerators to be constructed and operated to perform this research.

The first is an electrostatic pelletron to study the effects of solenoidal magnetic field, enlarged aperture, and high beam currents on electrostatic voltage stability. A sketch of the pelletron is displayed below. It is approximately 30 ft. long and 7 ft. in diameter. Associated with the pelletron is an SF_6 gas handling system composed of vacuum pumps, dryers, compressors, and heat exchangers. The central electrode housing the gate valve is charged to 5 MV using a charging chain system.



The second is a modified betatron, a rapid cycling betatron in which a solenoidal field provides stability against space charge beam dynamics effects. The modified betatron is very important for two reasons. First, it is the only accelerator technology option under active consideration that can go to arbitrarily high currents. Second, it can go to much

higher energies in a straightforward manner. The modified betatron is a planar racetrack machine which is approximately 5 ft. across and 20 ft. long.

The plan is to have both accelerators installed and operated in a common radiation enclosure. At WPL the floor of the experimental pit is sufficiently shielded and interlocked. An additional safety concern is oxygen deficiency hazard posed by the heavy and inert SF_6 gas used as a dielectric in the pelletron. If a leak occurred, approximately 8,300 cu.ft. of displaced air at the floor of the enclosure housing the pelletron.

It is expected that this experiment will run until electron cooling has been installed in the Recycler itself. At present the beginning of calender year 2001 is the anticipated date for this transition. If the E831-Focus collaboration at WPL is running during an upcoming fixed target run, we are planning on deferring enclosure entries around their schedule.

The other members of the experiment at present are:

Jim MacLachlan	FNAL BD/HQ	maclachlan@fnal.gov
Chuck Schmidt	FNAL BD/PSD	cschmidt@fnal.gov
Saeed Assadi	FNAL BD/MID	assadi@fnal.gov
Tom Kroc	FNAL BD/MID	kroc@fnal.gov
Alexi Burov	BINP, Russia	A.V.Burov@inp.nsk.su
~~Xiaoming Zhao~~	Indiana University	xzhao@fnal.gov
S.Y. Lee	Indiana University	sylee@fnal.gov
Wei Peng	BEPC, China	weipeng@waldo.fnal.gov