

12. Power Supplies and Power Conversion for the Neutrino Factory

12.1 Introduction

The engineering design of the power supplies for the Neutrino Factory has just begun. It is recognized that these power supplies will determine about 40% of electrical power needs of the facility (which is considerable). This subject needs more detailed analysis.

12.2 Power Supplies for the Proton Driver

The power requirements for the power supply for the proton driver is approximately 12-15 MW.

12.3 Power Supplies for the Four Solenoid Channels

Different power supplies are required to provide a current of 6000 amps to the solenoids in each of the channels as shown in Table 1 and is extracted from chapter 9. Due to the large stored energy in some of the solenoid channels the turn on time is significant. More critical though is the design of the quench protections systems which have to be an integral part of the power supply design

	# needed	Volts	Amps	Turn on time (secs)
Decay Channel	11	30	6000	122
Decay Channel Plus RF	2	30	6000	456
Induction Linac	2	30	6000	111
Cooling Channel	1	500	6000	2867

Table 1: Basic parameters for the solenoid power supplies.

12.4 Other Power Supplies

The power supplies for the other subsystems are somewhat described in the other chapters.

12.5 Total Power consumption

The overall power consumption of the facility according to the design presented in this report is in the range of 100-150 MW dependent on the details of the accelerator layout.

12.6 Summary

It is anticipated that the designs for the various power supplies needed for the Neutrino Factory will need engineering development, but not research. The power consumption for a 50 GeV accelerator is significant but within the capability of the laboratory network.

REFERENCE:

- [1] D. Wolff, Fermilab, private communication.