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## Chapter 6

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#### **1** INTRODUCTION

To run an ion source several power supplies and other electronic equipment are necessary. For many dc-operated ion sources commercial power supplies can be used. For a duoplasmatron, for example, or for other low-voltage arc ion sources, commercially available current-regulated power supplies are well suited for maintaining a stable arc plasma even without an additional series resistor. But inexpensive power supplies without electronic regulation can also be used to run ion sources in a dc mode. Such power supplies are discussed in Section 2.

If, on the other hand, pulsed mode operation of the ion source is required, then the necessary pulse switches have to be laboratory-made. Several examples of pulse switch designs are presented in the following sections.

For ion extraction at voltages of up to several tens of kilovolts, commercially available power supplies are well suited. For a few special applications, pulsed extraction is needed. Some examples are presented in Section 8.

The environment of the ion source electronics is dominated by high voltages of up to several hundred kilovolts. In many cases the entire ion source equipment package is on a platform at several hundred kilovolts and the ion source power supplies themselves are at an additional potential of several tens of kilovolts (see Figure 1). High-voltage sparks and breakdowns, which are sources of voltage spikes that can interfere with the electronics in the area, are unavoidable. Additionally, ion

### Computer Codes

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A compendium of computer codes used in particle accelerator design has been compiled in Reference 1. Here the general approach is described.

The codes described here run on large mainframe computers; however, the hardware improvement of small computers today has reached a level that makes it possible to implement most of these codes on a PC. The memory of these small computers can be expanded to several MB, which was not an easy task just several years ago even on a large computer. CPU performance has been improved as well,