The D–^{3}He cycle holds special interest because it does not generate excess neutrons. A balanced system is possible by small adjustments in the ratio of D to ^{3}He; this produces the ^{3}He via D–D fusion reactions occurring in the D–^{3}He fuel itself. Of course, additional ^{3}He can be obtained by the radioactive decay of tritium for mixing with deuterium to form the fuel. No inventory of additional fuel need be bred in the D–^{3}He reactor as would be the case in the breeding of tritium through the use of lithium in the D–T cycle.

Both the D–D and D–^{3}He cycles may be used for another type of fusion reactor we are considering with great interest. That reactor would employ the principle of direct conversion. Figure 3 illustrates the direct conversion of fusion power to electricity through what is called the "mirror machine." This system has been proposed and is being developed by Dr. Richard Post at Lawrence Radiation Laboratory at Livermore. Typically, the D–^{3}He reaction would be used in such a conversion system. The principal energetic products are charged helium and hydrogen ions.

As shown schematically in Figure 3, the reaction products from the fusion reactor would escape from the end of the magnetic mirror, and their already low ion density would be further reduced by expansion into a larger chamber. In this expansion the rather random motion of

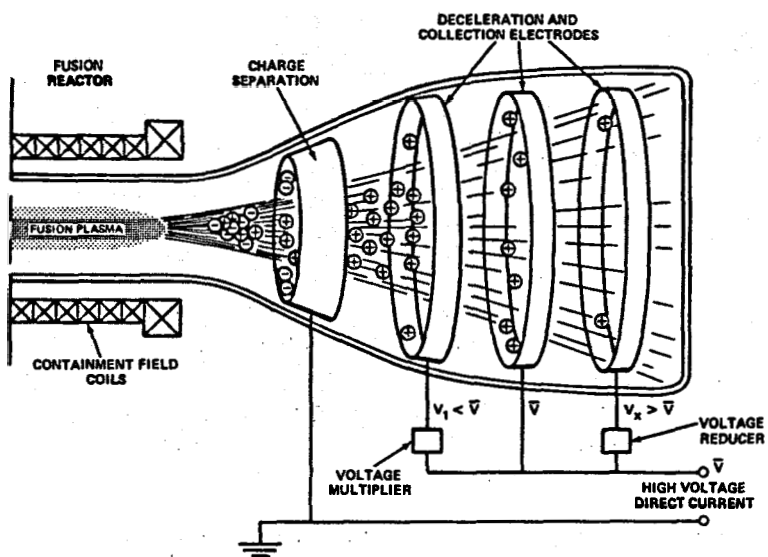

Figure 3. Fusion reactor with direct conversion.