

XIV. GASEOUS ELECTRONICS*

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RESEARCH OBJECTIVES AND SUMMARY OF RESEARCH

Our general objectives are concerned with a study of the plasma physics of gaseous lasers. We have been developing techniques for measuring such gas-discharge parameters as electron temperature, density, and distribution function. Recently we developed a theory for extending the useful range of microwave cavities for obtaining the electron density by cavity frequency shifts. These measurements, in conjunction with electron and ion temperature measurements, currently being made, will be used in our investigations of the observed time delay between the beginning of the excitation current and the output laser pulse. It is thought that this time delay is a measure of the excitation cross section for the particular laser line under study.

With the advent of the high-pressure molecular lasers, our attention is being focused on a study of their basic plasma properties. Experimenters have found that by mixing various gases with the main lasing constituent(s), high-power, highly efficient laser operation is possible. We have begun a study of the relationship between these gas additives and such relevant plasma parameters as discharge current, voltage, electron density, average electron energy, and the electron-distribution function $f(v)$. Since all the plasma transport phenomena are governed by $f(v)$, a major part of our work is devoted toward its study.

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