ATOMIC AND MOLECULAR PROCESSES
Manfred A. Biondi
Pittsburgh University

Prepared for:
Army Research Office - Durham
Advanced Research Projects Agency

24 February 1975
**Title:** Atomic and Molecular Processes

**Author:** Manfred A. Biondi

**Performing Organization:**
Depts. of Chemistry and Physics
University of Pittsburgh
Pittsburgh, Pa. 15260

**Contract or Grant Number:** DAHC04-73-C0037

**Report Date:** February 24, 1975

**Number of Pages:** 7

**Distribution Statement:** Approved for Public Release: Distribution Unlimited

**Supplementary Notes:** The findings in this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

**Key Words:** lasers, ion-molecule reaction rates, metal atoms, chemiexcitation, metastable species, excited states, electron-ion recombination, infrared emission, energy transfer processes, air species, fuel-oxidizer reaction, optical discrimination

**Abstract:** The research topics carried out under the present contract are stated and references are given to the publications of the scientific findings resulting from the research. The personnel supported by the contract are listed.
The findings in this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.
I. Summary of Research

During the period of the present contract, July 1, 1973 to June 30, 1974, research was carried out in the following areas of atomic collisions and upper atmosphere studies:

A. Laboratory and Theoretical Studies
   1. Laser Ion-Molecule Reaction Rates
   2. Metal Atom Chemiexcitation
   3. Excited State Production by Electron-Ion Recombination
   4. Processes Involving Metastable Species
   5. Infrared Emission from Energy Transfer Processes of Air Species and from Fuel-Oxidizer Reactions
   6. Radiative Properties of Simple Molecules for Optical Discrimination

B. Atmospheric Studies
   1. Particulate Detection Technology
   2. Optical Interferometer Studies of the Upper Atmosphere

The progress in these researches has been summarized in detail in the semi-annual Technical Progress Summary Reports Nos. 16 and 17.

II. Research Publications Produced under the Contract

The following is a list of the scientific publications which set forth the results of the research under this contract:
PUBLICATIONS


Publications - cont'd.


III. Personnel Supported by this Contract

The following personnel have received partial or total support under this contract:

Faculty Members:
- J. N. Bardsley
- M. A. Biondi
- T. M. Donahue
- W. L. Fite
- E. Gerjuoy
- F. Kaufman
- E. C. Zipf

Post-Doctoral Personnel:
- J. G. Anderson
- J. W. Bozzelli
- E. Enemark
- T. Finn
- E. Graham IV
- M. A. Hender
- R. Johnsen
- S. C. Liu
- H. H. Lo
- R. L. Myers
- T. L. Patterson
- G. Unger

Graduate Research Assistants:
- T. Barlak
- V. M. Bierbaum
- B. Carnahan
- J. S. Chang
- Y. F. Chong
- P. Erdman
- G. Halle
- B. N. Kim
- S. Z. Levine
- S. Lin
- S. L. Lin
- J. J. Margitan
- R. McLaughlin
- W. T. Rawlins
- S. Sinha
- C. V. Sukumar