Energetic X-Ray Processes in Atoms

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FINAL TECHNICAL REPORT

Energetic X-Ray Processes in Atoms

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1. Research Summary

With partial support from AFOSR, a broad experimental and theoretical program in research on atomic inner-shell processes has been carried out.

Dynamic correlation phenomena in atoms have been explored experimentally with synchrotron radiation as well as theoretically in terms of resonant scattering theory; special attention has been given to the elucidation of fundamental aspects of rearrangement following ionization in deep inner shells. The relativistic quantum theory of post-collision interaction has been formulated and perfected by inclusion of final-state interactions; critical predictions have been tested through experiments.

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The theory of multiphoton ionization in strong laser fields has been reexamined and tied to basic quantum electrodynamics. By quantizing the field and introducing suitable boundary conditions, a time-independent approach has been developed on the basis of formal scattering theory. The approach has been applied to photodetachment of the negative hydrogen ion, recently explored at LAMF; the theory agrees well with the new data.

2. Publications

Journal Articles


4


**Items in Conference Proceedings**


3. Professional Personnel

Bernd Crasemann, Professor of Physics, Principal Investigator
G. Bradley Armen, Research Associate to May 30, 1987
Dong-Sheng Guo, Research Associate to December 31, 1989
Xingdong Mu, Research Associate
Johannes Ruscheinski, Research Assistant

Stephen J. Schaphorst, Research Assistant

Stacey L. Sorensen, Research Assistant to March 15, 1989

Scott B. Whitfield, Research Assistant to June 30, 1989

Mei Chi Chen, Computer Programmer at NASA-ARC (half-time, to December 31, 1989).

Off-campus collaborators:

Teijo Aberg, Helsinki University of Technology

George S. Brown, Stanford Synchrotron Radiation Laboratory

Mau Hsiung Chen, Lawrence Livermore National Laboratory

4. Advanced Degrees Awarded
