The ORNL Controlled Fusion Atomic Data Center

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1 Introduction

The Controlled Fusion Atomic Data Center (CFADC) was established in 1958 and its mission is to collect, evaluate, recommend, and disseminate atomic and molecular collision data of urgent need in fusion energy research and development. The CFADC is supported through the U.S. Department of Energy, Office of Fusion Energy Sciences, and is part of the Oak Ridge National Laboratory's Physics Division.

2 Brief History

In 1958 a data center was established informally at Oak Ridge National Laboratory by Dr. C. F. Barnett to collect, review, evaluate and compile numerical atomic collision data of interest to controlled thermonuclear fusion research. Its first cross section compilation was published in 1960. In 1963 this undertaking was formally established as the Atomic and Molecular Processes Information Center, with the primary task of producing extensive annotated bibliographic files of atomic data related to fusion processes and compiling evaluated atomic collision data pertinent to fusion research. In 1970 the Atomic and Molecular Processes Information Center (AMPIC) became the Controlled Fusion Atomic Data Center (CFADC).

Highlights of the CFADC activities include production of volumes of recommended atomic data for fusion, known as the "Redbooks" (ORNL Technical Reports published in 11 volumes, during the period of 1961-1990) as well as collection and publication of a categorized bibliography of atomic and molecular processes of interest in fusion research. The bibliography covers published articles during the period 1950 - present. Since the data center's inception in 1958, over 100 journals have been regularly searched and over 60,000 individual entries have been accumulated. Presently, the bibliography may be queried on-line, through the World Wide Web (WWW), regarding the entries since 1978 (approximately 30,000).

An important part of the CFADC activity has been coordination through the international network of data centers, under the auspices of International Atomic Energy Agency (IAEA).

3 Current Projects

Significant efforts are focused to make the CFADC-WWW site the front line interface of the CFADC activities. This Web site is intended to serve as an electronic interface between the Data Center's resources and the fusion energy community. The archival bibliographic entries dating from 1950 to 1977 will be added on-line in the near future, as well as approved portions of the database produced by the NIST-JILA data center before its recent closure. Present tokamak fusion research puts emphasis on processes

in the cool, dense plasma of the divertor and plasma edge, with increased significance of molecular and transport related atomic data. A large database of elastic and charge exchange processes for isotopic combinations of ions, atoms and molecules of hydrogen has been produced and made available on the Web. It is also published in volume 8 of the IAEA "Greenbooks", Atomic and Plasma-Material Interaction Data for Fusion.

ALADDIN is a database management system accepted by the International Atomic Energy Agency for the exchange of atomic and molecular data of interest in fusion energy research and development. The databases and codes are available at the CFADC web site. In addition, on-line versions of the most often requested "Redbooks" have been uploaded to this site. Finally, reference manuals for the Atomic Data and Analysis Structure (ADAS) codes, developed at JET/Strathclyde, is mirrored by the CFADC, and making certain Auburn/Rollins/Strathclyde ADAS atomic data sets broadly available on-line.

4 Initiatives

Members of the CFADC have been among the initial organizers of the new conference entitled International Conference on Atomic and Molecular Data and Their Applications (ICAMDATA). It is designed to re-establish awareness of the important role of atomic data and data center activities. In the current plan of CFADC is production of charge exchange data from excited vibrational states of hydrogen molecules at sub-electron volt energies, of importance for the divertor plasma energy balance and in astrophysical modeling. Other initiatives are oriented toward atomic and plasma physics data and modeling activities in astrophysics, and towards developing a coordinated program in atomic data collection and dissemination of interest for plasma processing.

5 Personnel

The staff of the Controlled Fusion Atomic Data Center at ORNL consists of D. R. Schultz, P. S. Krstić, and F. M. Ownby. In addition, the CFADC relies for its bibliographic search on ORNL consultants (F.W. Meyer, C.C. Havener, M.E. Bannister, and P.C. Stancil) and external consultants (H.B. Gilbody, T.J. Morgan, R.A. Phaneuf, M.S. Pindzola, and E.W. Thomas).

The CFADC may be contacted via telephone ((423)-574-4701), fax ((423)574-4745), email (krstic@mail.phy.ornl.gov) and by mail. On-linr resources are available through the WWW at (http://www-cfadc.phy.ornl.gov).

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