

TOPbase/TIPbase

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Abstract. Current developments that are being carried out within the context of the atomic database service TOPbase/TIPbase are briefly summarized.

INTRODUCTION

TOPbase/TIPbase is an atomic database service that has been available on the Internet since 1993 from both the Centre de Données Astronomiques de Strasbourg (CDS) [1], France, and HEASARC [2], NASA Goddard Space Flight Center, USA. Although the current WWW user interface is browser based, direct access to the original command based interface is still being offered at the CDS through telnet at `cdsarc.u-strasbg.fr` (IP=130.79.128.5) with account id= `topbase` and PW = `Seaton+`. TOPbase [3,4] contains term energies, f -values and photoionization cross sections for astrophysically abundant ions ($Z = 1-14$; $Z = 16$; $Z = 18$; $Z = 20$ and $Z = 26$). They have been computed in LS coupling in the Opacity Project [5]. This database has averaged over 100 calls a month since it became operational. TIPbase (under development) will offer data from the current IRON Project [6], namely level energies, radiative transition probabilities, electron impact excitation collision strengths and rates for fine structure transitions of ions of astrophysical interest, with emphasis on the iron group. In the present paper we briefly describe the current developments that are being carried out to maintain and extend this service.

ATOMIC DATA

The atomic data contained in TOPbase/TIPbase have been calculated by an international group of experts from Canada, France, Germany, UK, USA and Venezuela with more than 15-year experience in large collaborative computational projects. State-of-the-art numerical methods are used such as those implemented in the atomic structure codes CIV3 [7] and SUPERSTRUCTURE [8] and collisional approaches based on the R-matrix method [9–11]. The emphasis is both on accuracy and completeness thus leading to series of papers where such issues have

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been extensively discussed, namely the series “Atomic Data for Opacity Calculations (I–XXIII)” in the *Journal of Physics B* and the on-going series “Atomic Data from the IRON Project (I–XLIV)” in *Astronomy & Astrophysics Supplement Series*. A measure of the quality of the data produced by the OP and IP is given, for instance, by the large number of f-values that have been selected for a NIST reference compilation [12].

CURRENT DEVELOPMENTS

TOPbase

TOPbase is at present undergoing a major revision of both the data and software in order to release a new version (2.0). Improvements can be summarized as follows:

1. New data for ions with low cosmic abundance, namely P, Cl and K, and for Fe I and Fe II are to be included in the database. This will enhance considerably its completeness being particularly useful for both isoelectronic and isonuclear studies.
2. Data for selected ionic species are being updated, in particular the lowly ionized Fe ions (Fe III–VI) and ions in the He, O and Si isoelectronic sequences.
3. The high-energy tails of the photoionization cross sections for both the ground and excited states are being recalculated using a Distorted Wave code (see [13]). This will be an improvement from the existing extrapolated $1/E^3$ tails that do not display the ionization edges and can be inaccurate.
4. A large number of f-values for Fe VIII–Fe XIII computed with the atomic structure code SUPERSTRUCTURE, referred to as the PLUS data [14], will be included in the database. At present they are available from [15].
5. TOPbase will incorporate versatile facilities for computing and manipulating the opacities computed in the Opacity Project [16–18]. Data for selected mixtures can be retrieved at present from [15].
6. The database will also include radiative acceleration data calculated by Seaton [19] which have been recently used to estimate the diffusion of iron-group elements [20]. The data are current available from [15].
7. The web user interface is to include graphic processing at the client end through the implementation of Java applets.
8. An attempt will be made in the summer of 2000 to interconnect TOPbase with the GAPHYOR atomic database [21] in order to implement inter-database searches.

TIPbase

TIPbase will become operational by the end of 2000. The first version will give access to energy levels, radiative transition probabilities and electron excitation rates related to fine-structure IR transitions.

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