

### The GAPHYOR Data Center

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The GAPHYOR (GAZ-PHYsique-ORsay) Data Center, located in Orsay at the Laboratoire de Physique des Gaz et des Plasmas (Laboratory of Physics of Gases and Plasmas, LPGP), was established by Prof. Delcroix in 1976. Its main activity was to develop and maintain an atomic and molecular data base of interest to physico-chemical research and applications (<http://gaphyor.lpgp.u-psud.fr>). This wide scope includes information on the properties of atoms, molecules, gases and plasmas and on their reactions. The data are indexed in consultation with a body of experts. Five separate sections compose this database, each addressing a distinct field of interest, namely properties of isolated atoms and molecules; collisions with photons; collisions with electrons; collisions and reactions between atoms and molecules; macroscopic properties of gases including plasma-surface interactions. The data base includes bibliographic entries citing journals, reports, books and proceedings of conferences covering the fields of atomic and molecular physics, of plasma physics and of chemical physics. Advanced query languages with on-line help are available for searching the five sections of the data base in English or French. In addition, the DANSE (Data Around the Net Search Engine [1]) code for on-line bibliographic searches, available through the International Atomic Energy Agency (IAEA) can be used to query the GAPHYOR data base on-line.

In addition to data base development, the GAPHYOR Data Center has the following activities:

- Implementation and management of a complementary numerical data base containing data of interest to selected applications, including thermonuclear fusion, plasma reactors, electric propulsion and optical diagnostics.
- Calculation, measurement and evaluation of atomic and molecular data, mainly for rare gases.
- Diagnostics and modeling of rare gases plasmas, supported by the code CLOEO (Calculation of high resolution Light Optical Emission at Orsay [2]) calculating the atomic level population in rare gas plasmas by Coronal and Collisional-Radiative models.

The latest data evaluations, on which we will report at the Meeting, in support of optical emission spectroscopy diagnostics. Towards this aim we are evaluating the following two data sets:

- a) Transition probabilities  $A_{ij}$  of rare gases atoms and ions, based on the Coulomb approximation in jK and LS coupling [3], in collaboration with the LUTH Laboratoire de Meudon, Observatory of Paris, where the SUPERSTRUCTURE code [4] is used giving  $A_{ij}$  in intermediate coupling IC; The IAEA and the Los Alamos National Laboratory (LANL) also jointly calculating ab initio the structure and  $A_{ij}$  of atoms and ions using the CATS [5] code,.
- b) Electron collision ionization and excitation cross sections of lowly ionized Ar and Xe species. For evaluating

these data we are using a calculational package of few body CTMC type codes [6] and the ACE [7] code of LANL.

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