



VAMDC: The Virtual Atomic and Molecular Data Centre: a Service Orientated Data Infrastructure for e- Research

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Abstract

VAMDC is a major new European initiative funded by the EU Framework VII programme that brings together a wide range of existing A&M databases with the specific aim of creating an e-infrastructure that is easily tuned to the requirements of a wide variety of users in academic, governmental, industrial or public communities.

1. Introduction

A knowledge of atomic and molecular data is important in a wide range of academic disciplines such as astrophysics, atmospheric physics, fusion, environmental sciences and combustion chemistry, such data are also required for the development of many industrial processes ranging from plasma processing to lighting. Currently these A&M data resources are highly fragmented and only available through a variety of highly specialized and often poorly documented databases, thus limiting the full exploitation of their scientific worth. This in turn hinders research across a wide range of topics including space exploration (the characterization of extrasolar planets, understanding the chemistry of our local solar system and of the wider universe, the study of the terrestrial atmosphere and quantification of climate change; the development of the international fusion programme for energy, and our understanding of radiation damage within biological systems.

2. The VAMDC project

The Virtual Atomic and Molecular Data Centre (VAMDC) is a major new European initiative that combines the expertise of existing A&M databases [1], data producers and service providers with the specific aim of creating an infrastructure that is easily tuned to the requirements of a wide variety of users in academic, governmental, industrial or public communities. VAMDC partners are responsible for many of the world's major A+M data resources, for example: The Vienna Atomic Line Database (VALD); CHIANTI an atomic database for spectroscopic diagnostics of astrophysical plasmas; the Cologne Database for Molecular Spectroscopy (CDMS); the BASECOL molecular line database; HITRAN (HIGH-resolution TRANSmision molecular absorption database); and many others.

This EU funded project, commenced its activities in July 2009 and will complete its work in December 2012 aiming to build a unified, secure, fully documented, flexible e-science environment-based interface to existing A&M data and a structure that can be modified and expanded as users require. The VAMDC project, is utilising emerging data access and interoperability standards developed in the framework of the global International Virtual Observatory (VO) initiative, placing these technologies at the core of its infrastructure. Specifically, the initial baseline core components forming the initial VAMDC infrastructure are based

on those developed by VAMDC partners through their involvement in the Euro-VO (<http://www.eurovo.org>) and UK AstroGrid (<http://www.astrogrid.org>) initiatives. The rationale for use of these technologies is that they have reached a high level of maturity enabling a rapid adaptation for use to support the needs of the A+M community.

In the initial stages of the system development and deployment, the infrastructure is tuned to enable the integration and access to the key data sets provided by the VAMDC partners. However VAMDC aims to interact widely with the general scientific community (selecting its data from validated, broadly used, and acknowledged data sets). This will ensure that the developed system will be sufficiently flexible to meet the needs of the wide variety of users from the academic, governmental, industrial communities. These interactions include hosting a range of meetings with users and data providers and other data base managers. VAMDC is interacting with other underlying infrastructures – such as EGEE and the Euro-VO – and is also participating in relevant standardisation activities such as the International Virtual Observatory Alliance (IVOA) [2], to ensure continued interoperability of VAMDC resources with these related e-infrastructures for example the IDIS initiative of the Europlanet project.

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References

[1] <http://www.vamdc.eu>

[2] <http://www.ivoa.net>