German Astrophysical Virtual Observatory

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GAVO

is Germany's contribution to the worldwide efforts in building a virtual observatory. GAVO provides

- easy and fast access to worldwide distributed heterogeneous astronomical data archives,
- a platform to publish observed or simulated astronomical data archives from the GAVO member sites
- on-demand theoretical models for commonly used astrophysical applications
- tools for extensive data mining in these federated databases via the Next Generation Search Engine (NGSE).

GAVO will use GRID-computing for astrophysical simulations and distributed database searches. Interoperability will facilitate the comparison between simulations and observational data sets.

GAVO Prototype

Architecture and implementation

GAVO is in the process of building a prototype implementation that is compatible with the various IVOA specifications and standards. The concept is sketched below.
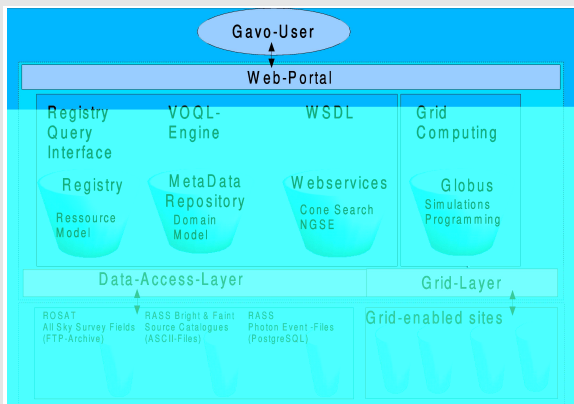
Using Apache Tomcat webserver, Apache's AXIS SOAP Engine, and Globus, the GAVO portal presents a unified interface to the user encapsulating the different underlying services.

Registry

A browseable registry of services and other resources following the current IVOA specification and compatible with the Open Archives Initiative (OAI) harvesting protocol is being implemented.

Archives

GAVO will initially provide access to a number of local archives:

- ROSAT All-Sky Survey (RASS) Bright Source Catalogue (18000 sources)
- RASS Faint Source Catalogue (10^5 sources)
- RASS photon event file (10^8 „sources")
- SDSS (European mirror site at MPA)
- VIRGO simulation archives (at MPA)
- RAVE (Radial Velocity Experiment) survey data (Mirror site at AIP)

Some of these archives will also be maintained and optimized for speedy access by several query services on the GAVO portal. For example, GAVO will augment the RASS photon event file with a spatial index based on the HEALPix pixelization scheme. Later on transparent access will be provided to archives published by other virtual observatories.
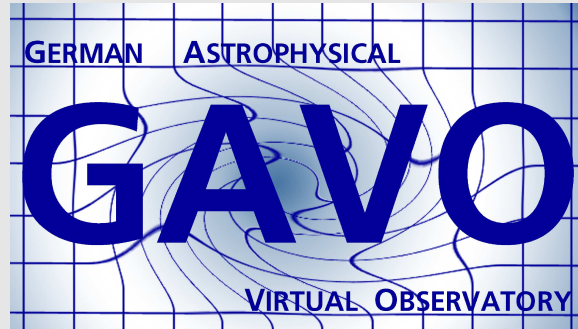
www.g-vo.org

Simulation data modeling

GAVO has taken the lead in the IVOA sub-working group on data modeling for simulations. GAVO is publishing simulation data that is closely matched to observational results. Simulation results can thus be contrasted against observational data in the most realistic way, which is the main goal of the „Theoretical Virtual Observatory".

Services

Focussing on the Simple Cone Search and Image Access Protocols GAVO provides implementations of these standard services for the various catalogues in the RASS archive.

One special service GAVO will provide is a probabilistic catalogue matcher (PCM) that matches one or more sources in an input list with sources from a selected „master"catalogue. The PCM is based on the principles described by Wolstencroft et al. (MNRAS 223, 279 (1986)), and solely based on sky-coordinates and their uncertainties.
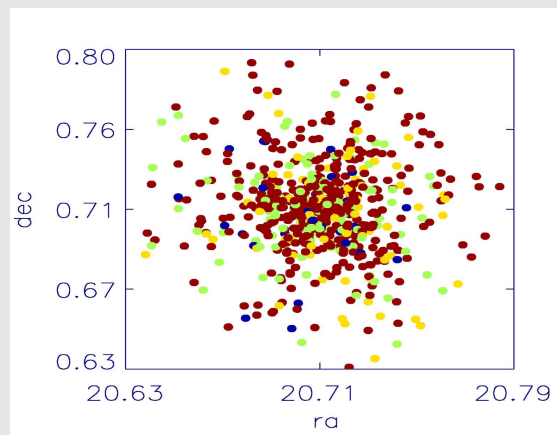
The scatter plot illustrates a match between a ROSAT source and the original photons. Different colours indicate different energy bands of the photons.

Grid technology

Using the Globus Toolkit GAVO establishes a network of grid-enabled computers. These form the basis for

- achieving interoperabilty
- running distributed simulations and visualisation tools
- simultaneously accessing distributed databases.