

# P The Virtual Observatory

Time: **Wednesday 5<sup>th</sup> April, 16.00**

Location: **Physics A**

Chair: **Nic Walton**

## P.1 ESA VO Activities

**Mr Christophe Arviset** (ESA) - Oral presentation

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ESA's centre in Spain, ESAC (European Space Astronomy Centre) is hosting ESA's astronomy missions archives (ISO, XMM-Newton, Integral for the time being, Herschel, Planck, Gaia in the future) developed and operated by the same team. This team is also responsible for all ESA VO related activities, including mainly: (a) making sure all ESA astronomy archives are fully part of the VO framework (b) developing VO tools and applications (eg VOSpec) (c) active participation in all EURO-VO and IVOA activities (d) making science research through the VO This talk will present the main ESA VO activities so far and will give some examples of science research that is being done through these VO tools.

## P.2 Probing Local Star Formation History Using AstroGrid - A Look at the Gould Belt

**Dr Jeremy Yates** (UCL) - Oral presentation

The AstroGrid workbench and VO applications can now give us a detailed look at our local star formation history ( $d < 300\text{pc}$ ), which is located in the Gould Belt, and help us construct the local Hertzsprung Russell Diagram. We are putting together the tools required to understand local star formation; these are mainly for SED construction, simple dust radiative transfer modelling and simple fitting to stellar atmosphere libraries. It is hoped that the methodology worked out for the Gould Belt can be used to interpret data from the WFCAM, UKIDS, SPITZER Legacy and JCMT Legacy surveys.

## P.3 Multi-Wavelength Astronomy using the VO

**Dr Eduardo Gonzalez-Solares** (Institute of Astronomy) - Oral presentation

*N. Walton<sup>1</sup>, J. Tedds<sup>2</sup>, A Richards<sup>3</sup>, S. Dalla<sup>4</sup> (<sup>1</sup> Institute of Astronomy, <sup>2</sup> Leicester, <sup>3</sup> Jodrell Bank, <sup>4</sup> Manchester)*

Current and forthcoming survey projects carried out by new facilities like Spitzer, WFCAM, VISTA, VST or Herschel to cite a few provide large data volumes in terms of imaging data as well as catalogue products. In order to study the properties of the sources detected in those different surveys and to make discoveries of interesting sources or even new types of objects the federation of the datasets is a must. However due to the large data volumes involved this is not a trivial task.

One of the main goals of the Virtual Observatory is to provide a system to ease the multi-wavelength astronomy. We will review the current capabilities of the UK Virtual Observatory, AstroGrid, under this perspective. The actual implementation already delivers a functional system capable of accessing a large set of resources: query and retrieval of catalogues with cross match capabilities as well as image archive query, retrieval and analysis.

We will stress the importance of AstroGrid and the tools developed as part of it to ease and speed up the access to a variety of multiwavelength surveys like FIRST, WFS, SDSS, SWIRE, UKIDSS, etc.

#### **P.4 Event driven observing**

**Dr Alasdair Allan** (University of Exeter) - Oral presentation

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Linking ground based telescopes with astronomical satellites such as SWIFT, and using the emerging field of intelligent agent technology to provide crucial autonomous decision making in software, the eSTAR and TALONS project have built a prototype observing system around HTN RTML and the IVOA VOEvent standards. We discuss the implementation of this prototype, and present the challenges facing further development, including the very real sociological one of user acceptance.

#### **P.5 Real access to virtual images with AstroGrid and ParselTongue**

**Dr Anita M S Richards** (Jodrell Bank Observatory) - Oral presentation

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A 100-Mb radio interferometry data set contains many GB of potential images at various combinations of resolution/sensitivity. For the first time, these can be generated on demand by any AstroGrid user, simply by requesting a position (or further optional details consistent with the Simple Image Access protocol). The AstroGrid Common Execution Architecture provides the server side of an interface between the workbench and specialised software for handling radio interferometry data. The client side employs ParselTongue, a Python-based scripting language developed by RadioNet to run specialised radio astronomy data reduction packages. The resulting images are described in a VOTable; they can thus be viewed directly in Aladin or the URLs can be extracted for downloading or passing to other tools. The same route will be used to provide access to MERLIN Key Project images (e.g. the northern GOODS region). We are also discussing the longer-term use of VO components and standards to provide access to future radio astronomy archives.

#### **P.6 The X-ray Synoptic Viewer: X-Ray Data Access and Reduction in the Virtual Observatory**

**Dr Duncan Law-Green** (University of Leicester) - Oral presentation

*J. Osborne<sup>1</sup>, C. Page<sup>1</sup>, R. S. Warwick<sup>1</sup>, M. G. Watson<sup>1</sup>* (<sup>1</sup> Dept of Physics and Astronomy, University of Leicester)

We describe planned software and infrastructure developments at LEDAS, the Leicester Database & Archive Service, the UK's primary archive for high-energy astrophysics data. These include providing Virtual Observatory access to all LEDAS datasets, and creating a powerful new software toolkit for high-energy data extraction, reduction and analysis. The X-ray Synoptic Viewer will provide uniform access to a wide range of raw and processed data from high-energy missions, and photometric tools to provide the X-ray flux history for

an arbitrary point on the sky. The X-Ray Correlator will compare the given position of an X-ray source with multiple external archives and identify potential counterparts based on a given figure of merit.

Potential applications of this software include identifying the most variable X-ray sources in a given class, to e.g. search for stellar capture events in nearby galaxies, which are predicted to show many orders of magnitude variation in X-ray flux on timescales of months-years.

## **P.7 The BMW-Chandra Serendipitous Source catalogue**

**Dr Roberto Mignani** (UCL-MSSL) - Oral presentation

In this talk the characteristics of the BMW-Chandra X-ray and multi-wavelength catalogue (to be released soon) are described together with the full potentialities of the catalogue for science applications.

## **P.8 Galaxy Formation and Evolution using Multi-Wavelength, Multi-Resolution Imaging Data in the Virtual Observatory**

**Mr Paresh Prema** (University of Cambridge) - Poster presentation

*N.A. Walton<sup>1</sup>, R.G. McMahon<sup>1</sup>. 1) Institute of Astronomy, University of Cambridge, Madingley Road, CB3 0HA.*

Observational astronomy is entering an exciting new era with large surveys delivering deep multi-wavelength data over a wide range of the electromagnetic spectrum. However, large surveys produce large data sets that have now reached terabytes (e.g. SDSS) in size and petabytes over the next 10 years (e.g. LSST). The Virtual Observatory is now providing a means to deal with this issue and users are now able to access many data sets in a quicker more useful form.

We describe our development of a SED matching technique that characterises objects detected in the UV to IR passbands and matches these observational SED's to model SED's generated through codes such as the Bruzual and Charlot models (Galaxev). A major challenge has been the accurate flux measurements of objects set by the differing resolutions in data from optical (e.g. HST 0.4 - 2 microns with a spatial resolution of 0.03 to 0.2 arc seconds) to IR (e.g. Spitzer 3 - 30 microns with a resolution 1 to 10 arc seconds). We describe the technique, and how this is being developed as an application available through standard Virtual Observatory interfaces, specifically AstroGrid's Common Execution Architecture.

We demonstrate the technique by deriving star formation histories of a selected sample of *U* band dropout galaxies with  $\langle z \rangle_{sim3}$ . These are then compared to the Eyles et al. (2005) sample of  $\langle z \rangle \sim 6$  galaxies.

## **P.9 Optimal sampling for agent observers**

**Mr Eric Saunders** (University of Exeter) - Poster presentation

*T. Naylor<sup>1</sup>, A. Allan<sup>1</sup> (1) University of Exeter*

Recently, there has been a large increase in the number of active research-grade, autonomous robotic telescopes. When such telescopes are linked by a communication infrastructure that allows remote access, an observer has a much greater choice about when and where to place

observations. For example, the opportunity arises for sparse temporal placement of observations when period searching, something impossible in the classical 'two week observing run' paradigm. However, how best to place a limited number of observations to cover the dynamic range of frequencies required by an observer is a non-trivial problem. We present an observation distribution, geometrically spaced in time, that can minimise aliasing effects arising from sparse sampling, substantially improving signal detection quality. However, the choice of base for such a series is critical to the success of this strategy. Additionally, an optimal sampling may be reordered, as long as the distribution of separations is preserved, with almost no loss of quality. Finally, we discuss the application of our work to the eSTAR autonomous observation system, which views partial datasets in terms of a set of metrics that codify the requirements of an astronomer, facilitating intelligent observation, analysis and follow-up.

## **P.10 AstroGrid Virtual Observatory Release 2006.2**

**Dr Nicholas A Walton** (IoA, Cambridge) - Poster presentation

AstroGrid, the UK's Virtual Observatory system, will be releasing its latest fully operational release system, 2006.2, during NAM2006.

This poster describes the increased functionalities offered to the end user in the 2006.2 release. The key data resources and applications accessible through the AstroGrid workbench will be itemised, Details of how astronomers can gain access to the system will be given.

We note the use of technologies and interoperability standards, and how use of AstroGrid gives end user access truly global resources, including large repositories of data across the UK, Europe, the USA and elsewhere.

We show how the astronomer can easily discover and visualise data from any major data centre by use of the 'AstroScope'. How then data from this can be stored in 'MySpace' and processed using applications either on the uses local machine or on remote servers. Specific example use cases are noted.

See <http://software.astrogrid.org> for further details.

## **P.11 Evaluation through Research Metrics**

**Mr Philip Roe** (Evaluametrics Ltd.) - Poster presentation

About 10,000 papers are published each year in astronomy, astrophysics and related fields. This number makes it hard to compare the quality and quantity of outputs from different sources in order to answer questions such as: is this department, or university or country delivering outputs at or above average standard. Evaluametrics has developed techniques for measuring research outputs which go beyond journal classification and the use of standard citation indexes. We have used these techniques for various government, institute and grant awarding clients.

In astronomy we have published assessments of the contribution of India and of the contribution made by women.

The poster will include reference to our website.