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The Virtual Observatory Tools: Search for Fossil Galaxy Groups

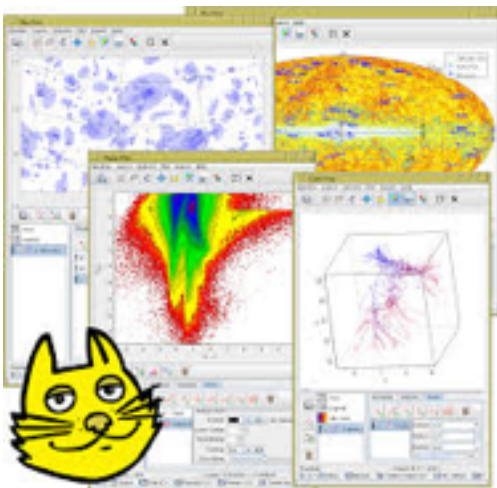
The Virtual Observatory:



Virtual Observatory (VO) could be defined as a collection of integrated astronomical data archives and software tools that utilises computer networks to form a scientific research environment in which astronomical research can be conducted. The VO consists of a number of data centres each with unique collections of astronomical data, software systems and processing capabilities. Several countries have initiated national virtual observatory programs that combine existing databases from ground based and orbiting observatories. As a result, data from all the world's major observatories are available to all users

and to the public. This is significant not only because of the immense volume of astronomical data but also because the data on stars and galaxies has been compiled from observations in a variety of wavelengths — optical, radio, infrared, gamma ray, X-ray and more. In a virtual observatory environment, all of this data is integrated so that it can be synthesised and used in a given study.

The Virtual Observatory includes:



- Tools that make it easy to locate and retrieve data from catalogues, archives, and databases worldwide
- Tools for data analysis, simulation, and visualisation
- Tools to compare observations with results obtained from models, simulations and theory
- Interoperability: services that can be used regardless of the clients computing platform, operating

system and software capabilities

- Access to data in near real time, archived data and historical data
- Additional information, documentation, user-guides, reports, publications, news and so on

The Project:

A fossil galaxy group consists of an isolated, luminous early-type galaxy embedded in an extended X-ray halo. The formation and evolution of these structures is still a matter of debate. To better understand the origin of these structures, it is crucial to study their faint galaxy population, as well as their large-scale environment, to determine in particular whether they are isolated or not. Their denomination, "fossil", comes from their possible formation scenario in which they may have collapsed at an early epoch, being the oldest and most undisturbed galaxy systems not yet absorbed by larger halos.

The aim of this project is to search for fossil galaxy groups in the Sloan Digital Sky Survey (SDSS) Twelfth Data Release DR12. Since a fossil group can be better recognised by correlating its optical image with its X-ray emission, the work involves multi-wavelength analysis, in which the use of the VO is invaluable. The following Virtual Observatory and related technologies will be used in this work: Open SkyQuery, SQL (Structured Query Language) in SDSS CasJobs, and Open SkyQuery tool(XMATH), and ADQL (Astronomical Data Query Language) in the NVO (National Virtual Observatory) tool Open Sky Query.