GLORIA In A Nutshell

GLORIA stands for "GLOBal Robotic-telescopes Intelligent Array" and will be the first free and open access network of robotic telescopes in the world. It will provide a Web 2.0 environment where users can do research in astronomy by observing with robotic telescopes, and/or by analyzing data that other users have acquired with GLORIA, or from other free access databases, such as the European Virtual Observatory.

Benefits of the Network

Users with no telescopes will have access to a large number of robotic instruments in the network with a dedicated web applications. During the three years of the project, at least 17 telescopes will be integrated into the network, with 12 of them currently operational.

Telescope owners will be able to use software tools provided by GLORIA to robotize their telescopes, to do observations and analyse the data. They will be also invited to join the network, dedicating some of their observation time for other users and gaining wider access to network resources.

All standards, software and documentation developed by GLORIA will be offered to the community under free licence to use, distribute and modify.

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GLORIA project will define free standards, protocols and methodologies to allow citizen and professional scientists to incorporate their telescopes and all related instrumentation (camera, filter wheels, domes etc.) into the network.

OPEN ACCESS

GAMMA-RAY BURST ALERTS

An important aspect of GLORIA’s operation will be the capability to respond autonomously to alerts regarding new astrophysical events such as supernovae and gamma-ray bursts. A standard Alert programming interface will be designed for GLORIA’s scheduler to allow the network to respond to these events. The message carrying the observational request is sent to one or more participating robotic telescopes to optimise the follow up observations by the network.

GAMMA-RAY BURST ALERTS

ONLINE EXPERIMENTS

GLORIA provides the mechanism for users to access and control the telescopes remotely and make observations. Web-authoring tools will enable users to create their own online experiments.

Two types of experiments will be available: Interactive, with users getting direct remote control of the telescope functions; Batch, when users send requests for target observations via the web interface and the network performs them automatically.

Batch mode of operation results in much more effective usage of network resources. Dedicated Observation Time Scheduler will be developed to prepare optimal observation schedules for all telescopes in the network. This is a highly non-trivial task for a network of heterogeneous telescopes.

OFFLINE EXPERIMENTS

GLORIA’s archiv and other public data-bases are used to carry out astronomical research by professional, amateur and citizen scientists. GLORIA also offers a web environment for analysing meta-data similar to the European Virtual Observatory and Galaxy Zoo.

OFFLINE EXPERIMENTS

LUIZA: Analysis framework for GLORIA

One of the challenges we have to face in designing environment for GLORIA off-line experiments is dealing with huge amounts of data and large variety of analysis tasks. We need an analysis framework which would be both very efficient and very flexible. These are requirements new to astronomy. However, High Energy Physics experiments deal with enormous amounts of data and complicated analysis tasks since many years.

Experiments at CERN Large Hadron Collider read information from about 100 million electronic channels, which is equivalent to taking 100 MIPexl image of the detector 20 million times per second. Detectors at the future International Linear Collider (ILC), which is next generation e+e- collider under study, will deal with even larger “images”. Dedicated Marlin framework has been developed for efficient data reconstruction (corresponding to image reduction in astronomy) and analysis. We decided to adopt this framework for the needs of data analysis in GLORIA.

Data analysis can be divided into small, well defined steps, implemented as so called processors. LUIZA is a framework which ensures consistent data flow between processors in the data analysis chain. The main advantage of this solution is its flexibility. The idea is to develop a large number of processors in GLORIA, doing many different tasks, so user is always able to find a set which matches his/her needs. He is then able to define the whole analysis chain at run time, by specifying list of active processors from the level of web interfaces.

OUTREACH & EDUCATION

GLORIA is providing live web broadcasts of astronomical events and educational resources to engage students’ and public interest in astronomy.

Message to the future

About 500 photos from users all over the world collected in an Venus-Transit outreach action.

Still to come:

Total Solar Eclipse, November 13, 2012
Total Solar Eclipse, November 3, 2013
Total Lunar Eclipse, April 15, 2014

for more information visit http://gloria-project.eu

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Live Broadcasting of Astronomical Events

Transit of Venus, June 6, 2012
Aurora borealis, September 24-25, 2012

Background photo: PI of the Sky robotics telescopes at ITEA-ZEUS in El Arenosito (Huelva), Spain. Poster Template is from http://ingrid-templates.org/2010/04/24/poster-traditional/ Creative Commons Attribution-ShareAlike 3.0 Unported License.

Types of Offline Experiments

Classification of variable stars
Evolution of variable stars with time
Optical transient searches
Occilations of stars by solar system objects

As with online experiments, web authoring tools will allow users to create their own offline experiments.