UpGLADE: community-driven open-data infrastructure for gravitational-wave cosmology

OSCARS
Open Science Clusters' Action for Research & Society

UpGLADE is building the largest open-access, community-driven galaxy catalogue to advance gravitational-wave cosmology and address the Hubble tension - the discrepancy in measurements of the universe's expansion rate. By linking gravitational-wave (GW) events with their possible host galaxies, the project will enable more precise cosmological measurements of the Hubble constant using GW standard sirens, and foster worldwide collaboration in multi-messenger astronomy.

ESCAPE
Astronomy, Nuclear and Particle Physics

Challenge

The Hubble constant (H_0) defines the universe's expansion rate. The Hubble tension is the main challenge: different measurement methods yield conflicting H_0 values. GWs from compact binary mergers - standard sirens - are a new, independent way to measure H_0. However, inadequate galaxy catalogues prevent its accurate use.

Solution

Creation and release of the UpGLADE Galaxy Catalogue, the most complete open-access, all-sky galaxy database to date.
It will deploy a queryable database integrated with existing tools and Virtual Observatory standards for maximum interoperability, and will support AI-ready data types.
The project will also upgrade GLADEnet into an interactive platform for collaborative data curation.

Scientific Impact

UpGLADE sets a new benchmark for open, collaborative, and AI-ready scientific infrastructures, and will enable the most accurate dark siren measurement of the Hubble constant to date, advancing GW Cosmology.

Partners

Laboratoire des 2 Infinis - L2IT-CNRS

In-kind contributors:
University of Perugia, University of Warwick and University of Glasgow

https://oscars-project.eu/projects/upglade-community-driven-open-data-infrastructure-gravitational-wave-cosmology