

Report on the 2010 Activities of the Center for Astronomy and Astrophysics of the University of Lisbon (CAAUL)

J. Bergeron 13-02-2012

General

In the year 2010, CAAUL has been very successful in (i) increasing its scientific productivity as compared to the previous three years in all domains (Solar system planets, star-forming local galaxies, mid-infrared and sub-millimeter studies of distant galaxies, theoretical cosmology: 29 refereed international publications), (ii) increasing its participation in international instrumentation projects (ground and space) with a strong collaboration with the technical group of the Faculty of Sciences of the University of Lisbon, (iii) securing funding (CAAUL PIs or co-Is) from FCT, CERN and EU-FP7 for various scientific projects.

The unit has also actively pursued its master and PhD thesis programme together with its initiation projects, and has been pro-active in outreach activities, including those associated with the International Year of Astronomy (IYA 2009 extended in 2010).

In overall, the 2010 achievements are excellent.

Scientific achievements

Planetary systems in the Solar system

Data from the Cassini/Huygens ESA mission have been analyzed and modeled, resulting in several publications on Titan's properties. In addition, participation in the NASA Juno mission, led to published studies of a spectro-imager for a possible, future ESA L-class mission.

Star-forming local galaxies

A most productive exploitation of the Virgo cluster survey by the ESA Herschel mission (dust content and properties, galaxy Luminosity Function, star-forming dwarf galaxies), as well as other nearby galaxies observed with Herschel. Some of these publications are already very well cited.

Distant galaxies

The group has been involved in mid-infrared and sub-millimeter studies of distant galaxies and quasars which led to the detection of polycyclic aromatic hydrocarbon (PAH), with the Spitzer satellite, and studies/detection of complex molecules. It has also participated in the Great Observatories Origins Deep Survey (GOODS).

In addition, CAAUL is actively participating in the ALMA (millimeter/submillimeter array) project which is an international partnership. The observatory is located in northern Chile at an altitude of 5000 meters. J. Afonso was a member of the ALMA Scientific Advisory Committee (ASAC) and is a member of the ESO-STC ALMA European subCommittee (ESAC). CAAUL has co-organized with CAUP a ALMA National Workshop in 2010 and should organize a ALMA National Community Day in 2011. The work of the group is preparing the Portuguese community for the use of ALMA for cycle 0 and beyond.

Theoretical cosmology

The group continues to be most active in the fields of classical and quantum gravity, wormhole geometries, and tests and extensions of general relativity. The number of publications is impressive and some already have a very good citation index.

Participation in instrumentation projects

- ESPRESSO is an echelle spectrograph with a resolving power of 120,000 to be mounted at the VLT Combined-Coude Laboratory. Phase A was completed in 2010 and the project is in the imple-

mentation phase. First light on telescope is planned for 2016. With CAUP (Primary Portuguese partner for FCT 2008/2010 funding/funding request), CAAUL is part of an international consortium led by the University of Genève, and is in charge of the optical design and manufacture of the Coudé Train.

- Gaia is a ESA ambitious mission which will survey more than one billion stars and chart a three-dimensional map of our Galaxy. It will be launched in 2013. CAAUL is one of the four Portuguese members of the Gaia Data Processing and Analysis Consortium, a very large consortium spread throughout more than 20 countries. In addition, CAAUL is active in the Instrument Modelling Unit.

- PLATO is a space mission aiming at studying planetary transits to characterize exoplanets and simultaneously measuring the seismic oscillations of their parent star. [Knowing now, that it has not been selected as a ESA M1-M2-class mission, and will be re-submitted for the ESA M3 mission call.] CAAUL is a member of the scientific consortium led by CNES and in charge of data processing algorithms and developing a ground segment (OGSE).