Astronomy ESFRI & Research Infrastructure Cluster

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Open-access publications from Mass Participation Experiments

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Abstract

Four recent publications on three running mass participation experiments connected to the ASTERICS project are introduced and their context in the ASTERICS-DECS activities are explained.

I. COPYRIGHT NOTICE

II. DELIVERY SLIP

	Name	Partner/WP	Date
From		WP2 - DECS	
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III. DOCUMENT LOG

Issue	Date	Comment	Author/Partner
1	18/03/2019	first version	J.F. Jarvis / OU
2	20/03/2019	review comments	R. van der Meer / ASTRON
3	21/03/2019	Response to review comments	J.F. Jarvis/OU

IV. APPLICATON AREA

This document is a formal deliverable for the GA of the project, applicable to all members of the ASTERICS project, beneficiaries and third parties, as well as its collaborating projects.

V. TERMINOLOGY

A complete project glossary is provided at the following page:
http://www.asterics2020.eu/glossary/

VI. PROJECT SUMMARY

ASTERICS (Astronomy ESFRI & Research Infrastructure Cluster) aims to address the cross-cutting synergies and common challenges shared by the various Astronomy ESFRI facilities (SKA, CTA, KM3Net & E-ELT). It brings together for the first time, the astronomy, astrophysics and particle astrophysics communities, in addition to other related research infrastructures. The major objectives of ASTERICS are to support and accelerate the implementation of the ESFRI telescopes, to enhance their performance beyond the current state-of-the-art, and to see them interoperate as an integrated, multi-wavelength and multi-messenger facility. An important focal point is the management, processing and scientific exploitation of the huge datasets the ESFRI facilities will generate. ASTERICS will seek solutions to these problems outside of the traditional channels by directly engaging and collaborating with industry and specialised SMEs. The various ESFRI pathfinders and precursors will present the perfect proving ground for new methodologies and prototype systems. In addition, ASTERICS will enable astronomers from across the member states to have broad access to the reduced data products of the ESFRI telescopes via a seamless interface to the Virtual Observatory framework. This will massively increase the scientific impact of the telescopes, and greatly encourage use (and re-use) of the data in new and novel ways, typically not foreseen in the original proposals. By demonstrating cross-facility synchronicity, and by harmonising various policy aspects, ASTERICS will realise a distributed and interoperable approach that ushers in a new multi-messenger era for astronomy. Through an active dissemination programme, including direct engagement with all relevant stakeholders, and via the development of citizen scientist mass participation experiments, ASTERICS has the ambition to be a flagship for the scientific, industrial and societal impact ESFRI projects can deliver.

VII. EXECUTIVE SUMMARY

Four recent publications on three running mass participation experiments connected to the ASTERICS project are introduced and their context in the ASTERICS-DECS activities are explained. Future experiments and the prospects for resulting publications are also discussed.

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1. Introduction

Deliverable 2.9 for the Dissemination, Engagement and Citizen Science (DECS) work package (WP) of ASTERICS consisted of Task 2.5 - Internal Dissemination and Project Outreach. Since the completion of deliverable 2.6 (titled the same as D2.9) in February 2018 our three active citizen science experiments have produced four publications:

- R. Bird, M. K. Daniel, H. Dickinson, Q. Feng, L. Fortson, A. Furniss, J. Jarvis, R. Mukherjee, R. Ong, I. Sadeh, D. Williams, 2018, arXiv:1802.08907 (in Proceedings of Topics in Astroparticle and Underground Physics): *Muon Hunter: a Zooniverse Project.*
- P. Homola, G. Bhatta, Ł. Bratek, T. Bretz, K. Almeida Cheminant, D. A. Castillo, N. Dhital, J. Devine, D. Góra, P. Jagoda, J. F. Jarvis, M. Kasztelan, K. Kopański, D. Lemański, M. Michałek, V. Nazari, P. Poznański, K. Smelcerz, K. Smolek, J. Stasielak, M. Sułek, O. Sushchov, J. Zamora-Saa, 2018, arXiv:1804.05614 (in TAUP 2017): *Search for Extensive Photon Cascades with the Cosmic-Ray Extremely Distributed Observatory.*
- K. Almeida Cheminant, Ł Bratek, D. E. Alvarez-Castillo, N. Dhital, D. Góra, P. Homola, R. Kamiński, M. Kasztelan, K. Kopański, P. Kovacs, M. Krupiński, M. Magryś, M. Marek, V. Nazari, M. Niedźwiecki, W. Noga, K. Oziomek, M. Pawlik, K. Rzecki, J. Zamora-Saa, F. Simkovic, K. Smelcerz, K. Smolek, J. Staliesak, O. Sushchov, K. Woźniak, 2018, arXiv:1810.06953 (in Acta Physica Polonica B Proceedings Supplement, vol. 11): *Cosmic Ray Extremely Distributed Observatory: a global network of detectors to probe contemporary physics mysteries.*
- A.J. Norton, 2018, Research Notes of the American Astronomical Society, Volume 2: *A Zooniverse Project to Classify Periodic Variable Stars from SuperWASP.*

2. Context

This document reports on four open-access publications for this deliverable hosted on the green open access sites arXiv and Research Notes of the American Astronomical Society. These publications have been produced between February 2018 (the date of the report on deliverable 2.6 which also focused on open-access publications) and March 2019 (the date of this deliverable report) and address the mass participation experiments 'Muon Hunters', 'Dark Universe Welcome' (within the CREDO project) and 'SuperWASP Variable Stars'.

The publication outputs to date are as expected at this stage for each of these projects. We also have two additional projects; one recently launched and one in active development.

1. The 'Muon Hunters 2.0: Return of the Ring' project aims to identify gamma-ray signals in images taken by the VERITAS telescopes. In contrast to the first version of the Muon Hunters Project, version 2.0 utilises a machine learning algorithm and the public are

now needed to help tell how well this algorithm is doing in identifying gamma-ray rings in the data.

2. The 'Euclid – Challenge the Machines' project aims to identify strong gravitational lensing events in simulated Euclid data and in Hubble Space Telescope data. As well as being available in the standard browser version this project is also a pioneer of the mobile device capabilities of the Zooniverse platform. The project has recently passed Beta testing and is now under review by the Zooniverse community before being released in the near future.

3. Objectives

These publications have all been facilitated by ASTERICS and thus there are members of the ASTERICS DECS team as co-authors. All publications are linked either directly or indirectly to the ESFRI pathfinder facilities and as a result involve research groups and organisations that extend beyond the ASTERICS consortium itself and even beyond the EU. This has the direct effect of increasing the international impact of the ASTERICS projects and meeting the core objective to 'Disseminate the results of ASTERICS to as wide an audience as possible'.

The objective for these particular publications is to provide an ongoing narrative for the mass participation experiments they address. The Bird et. al. paper updates readers on the Muon Hunters project and the huge success it proved to be while the Homola et. al. and Almeida Cheminant et. al. papers both continue the narrative of the CREDO project and the Dark Universe Welcome mass participation experiment it incorporates. In contrast the Norton et. al. paper represents the start of this particular project and thus more papers are expected in the future as this project proceeds and develops.

By virtue of being open source each of these publications is freely accessible to all. Potential audiences for these papers range from the international research community to the non-professional volunteers giving their time to the mass participation experiments.

4. Analysis

As stated in the report for deliverable 2.6 the DECS work package continue to monitor publication outputs but have not, and do not intend to, actively encourage rapid or increased volume of publications. This responsibility continues to be delegated to individual science teams who have invested significant time and effort into launching, running and evaluating the experiments.

This round of publications for deliverable 2.9 represents all of the active experiments at this time. We feel it is appropriate that further publications for each of these experiments are

released at a time based upon the judgement of the individual sciences teams and the progress made by the experiments. Furthermore, we continue to operate under the policy that quality is much more important than quantity for these publications.

It should be noted that no ASTERICS budget was used to publish these publications as both the arXiv open access repository and Research Notes of the American Astronomical Society are free at the point of use.

5. Next steps

As the lifetime of these mass participation experiments will extend well beyond the end of the ASTERICS project we foresee many more publications from both the existing and the actively being developed experiments detailed in this report.

The greatest lesson to take from the rate of these publications and the quality of their content is that the light touch approach has worked very well in this situation. The science teams have been the best source of information for when a publication would be appropriate and they have been well motivated to share their results.