Step 1 Evaluation Report

CONFIDENTIAL

Call reference	ERC-2018-COG
Activity	Consolidator Grant
Funding scheme	ERC Consolidator Grant
Panel name	PE9
Proposal No.	818713
Acronym	Q4D
Applicant Name	Nicholas ROSS
Title	Quasars in the 4th Dimension

EVALUATION CRITERIA

Criterion 1 - RESEARCH PROJECT
Ground-breaking nature and potential impact of the research project
To what extent does the proposed research address important challenges?
To what extent are the objectives ambitious and beyond the state of the art (e.g. novel concepts and approaches or development between or across disciplines)?
To what extent is the proposed research high risk/high gain?

Scientific Approach
To what extent is the outlined scientific approach feasible bearing in mind the extent that the proposed research is high risk/high gain (based on the Extended Synopsis)?

Criterion 2 - PRINCIPAL INVESTIGATOR
Intellectual capacity, creativity and commitment
The questions below can have one of the following four responses: Outstanding/Excellent/Very good/Non-competitive
To what extent has the PI demonstrated the ability to propose and conduct ground-breaking research?
To what extent does the PI provide evidence of creative independent thinking?
To what extent have the achievements of the PI typically gone beyond the state of the art?

PANEL SCORE AND RANKING RANGE

Final panel score:	B (is of high quality but not sufficient to pass to Step 2 of the evaluation. Please note that you may also be subject to resubmission limitations in the next call)	**Ranking range*:**	55%-64% For your information, only the top 24% of the proposals evaluated in panel PE9 were retained for Step 2.

* Ranking range of your proposal out of the proposals evaluated by the panel in Step 1, in percent, from 1% for the highest ranked proposals to 100% for the lowest ranked.

PANEL COMMENT

This evaluation report contains the final score awarded by the ERC review panel during the first step of the ERC Consolidator Grant review and the ranking range. The discussion of the panel was conducted within the context of the individual reviews submitted by ERC panel members.

The panel closely examined all the individual review reports and, while not necessarily subscribing to each and every opinion expressed, found that they provide a fair overall assessment. The comments of the individual reviewers were the basis for the discussion and the final recommendation of the panel, and are included in this report.

The goal of the project is the collection of a comprehensive dataset based on several next-generation state-of-the-art (SDSS-V, DESI, LSST, 4MOST, ESA Euclid and JWST) AGN surveys, with the ultimate aim to explore the SMBH activity feedback on galaxy evolution. The objectives of the proposal are ambitious, but the proposed approaches and methods to reach them are vague. The PI is an expert in research methodologies in data science and Machine Learning. He is qualified to produce the novel algorithms necessary to carry out most of the program. On the other hand, one of the crucial tasks of the project should be a proper treatment and adequate modelling of the relevant physical processes, but only one work package (out of six) is devoted to this question. In particular, a high priority task seems to be the planned holistic accretion disk-to-cosmological scale simulations. It is not evident that the PI's expertise is sufficient to tackle this task.

Overall the panel considers this proposal to be of reasonably good quality. However, based on the combined set of criteria used in the assessment it was not ranked highly enough to be retained for Step 2. The panel therefore recommends that the proposal should not be retained for Step 2 and should not be considered for funding.

REVIEWER COMMENTS

The following individual reviews have been carried out independently prior to the panel meeting and do not necessarily reflect the panel's final opinion

Reviewer 1

Research Project
Ground-breaking nature and potential impact of the research project Our goal is to produce and analyse a new extragalactic dataset of the variable extragalactic Universe. This is an ambitious project planning to use and combine the data from several next-generation surveys. Most of the outlined tasks are medium-risk, except the WP5: the observation of quasars with the James Webb Space Telescope is likely but cannot be guaranteed. The gain is very high. **Scientific Approach** Except for the task related to the observations of quasars with the James Webb Space Telescope, the project is feasible.

Principal Investigator	
To what extent has the PI demonstrated the ability to propose and conduct ground-breaking research?	Excellent
To what extent does the PI provide evidence of creative independent thinking?	Excellent
To what extent have the achievements of the PI typically gone beyond the state of the art?	Very good

Comments (Optional for reviewers)
The PI has very good records; he is an experienced researcher with good management skills.

Reviewer 2

Research Project
Ground-breaking nature and potential impact of the research project The PI proposes to combine the data from several next-generation state-of-the art surveys (SDSS-V, DESI, LSST, 4MOST, ESA Euclid and JWST) to elucidate how the energy released by active nuclei impacts the galaxy population and to discover new variable extragalactic phenomena. Part of the requested funds will be used to buy access to SDSS-V and DESI data. In practice, new software packages to deal with the data will be produced and exploited to generate quasar catalogues and carry out demographic studies, to perform light-curve and spectral analyses, to discover new transient phenomena. In addition, it is planned to develop new holistic accretion disk-to-cosmological scale simulations that explain observational results and link them to “quasar feedback”. However, it is not explained which new ideas or new approaches will characterize these new simulations. On the whole, the main strength of the project seems to be the combined analysis of the huge amount of forthcoming data with novel data science algorithms and techniques, on which little is said. **Scientific Approach** The PI is an expert in research methodologies in data science and in machine Learning. He is therefore qualified to produce the novel algorithms necessary to carry out most of the program. As for the .new accretion disk models and simulations of quasar feedback he will rely on the guidance of experts at the university of Edinburgh.

Principal Investigator	
To what extent has the PI demonstrated the ability to propose and conduct ground-breaking research?	Excellent
To what extent does the PI provide evidence of creative independent thinking?	Excellent
To what extent have the achievements of the PI typically gone beyond the state of the art?	Excellent

Comments (Optional for reviewers)
No comments received

Reviewer 3

Research Project
Ground-breaking nature and potential impact of the research project The proposed research aims at improving our knowledge of galaxy evolution by using time-resolved survey observations of accretion onto supermassive black holes. Understanding the evolution of galaxies is one of the major challenges in modern astrophysics. In addition, the PI hopes for the serendipitous discovery of new phenomena. Much of the effort will go into extracting relevant data from surveys; the data reduction pipelines clearly go beyond the state of the art. It is not clear how the numerical modeling will go beyond the state of the art except for being constrained by new data in the temporal domain. Collecting and analyzing the survey data is a major task, but it is not clear how the data and the modeling will advance our understanding of galaxy evolution and what specific issues will be solved. WP5 seems disjoint. **Scientific Approach** The PI clearly has access to some of the required data and could buy into some of the surveys to obtain access. For instance, why is WEAVE not used when the PI could obtain free access even before DESI becomes operational. WP 1 to 3 are largely data collection efforts and are feasible. WP4 should deliver a completely new accretion disk model and will not be realistic to do with the listed resources.

Principal Investigator	
To what extent has the PI demonstrated the ability to propose and conduct ground-breaking research?	Very good
To what extent does the PI provide evidence of creative independent thinking?	Excellent
To what extent have the achievements of the PI typically gone beyond the state of the art?	Very good

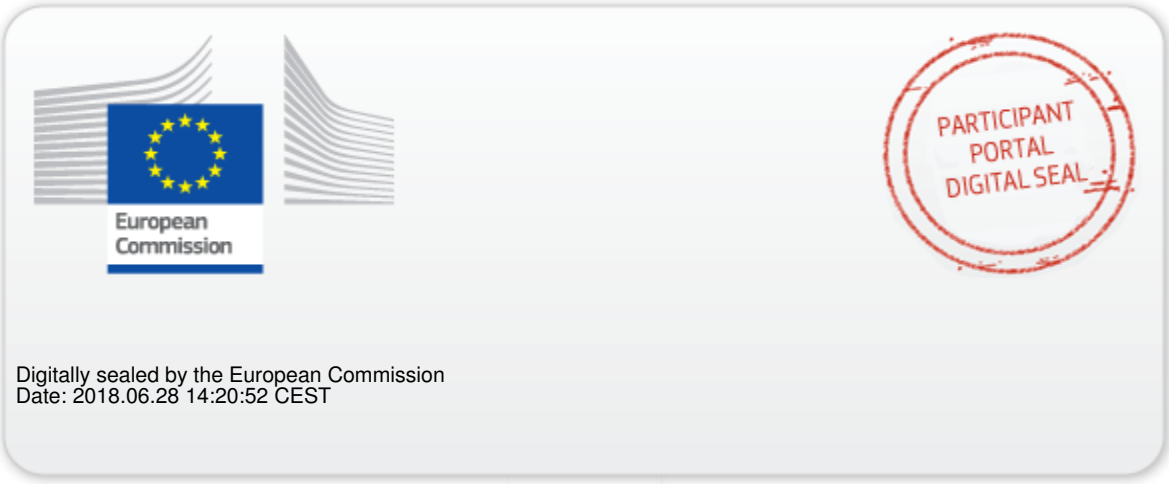
Comments (Optional for reviewers)
No comments received

Reviewer 4

Research Project
Ground-breaking nature and potential impact of the research project The goal of this project is to put together all available data on AGN that will be collected by the next-generation surveys in order to establish a large sample of AGN with their detailed time evolution. This could shed some light on the still poorly understood quasar feedback on galaxy evolution. Although the goals of the proposal appear very ambitious, the methods to reach them are a bit vague. For example, there is no information about the software of WP1, or about the so-called “new holistic accretion disk-to-cosmological scale simulations” of WP4. **Scientific Approach** The main emphasis of the proposal is about the collection of data from many different surveys. It would seem that an important aspect of the project should be a better understanding of the physical processes and the adequate modelling, but only one work package among six is devoted to this question. Moreover, it is not clear from the proposal whether the PI’s expertise is sufficient to tackle this task, even if the help of two experts is indicated. Requesting a significant amount of money for the “buy-in” to two of the surveys is also surprising. The last work package is a bit disconcerting since it just mentions the possibility to discover a new type of objects.

Principal Investigator	
To what extent has the PI demonstrated the ability to propose and conduct ground-breaking research?	Very good
To what extent does the PI provide evidence of creative independent thinking?	Very good
To what extent have the achievements of the PI typically gone beyond the state of the art?	Very good

Comments (Optional for reviewers)
The PI has a good track record. In the list of selected presentations, one can find only two invited talks in the last five years. The PI has some limited experience with the supervision of PhD students.



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