

c Resources (including project costs)

Here we summarize and justify the budget.

TEAM COMPOSITION: Our team will consist of the P.I, three postdoctoral research associates (PDRAs), and 1 PhD student. Two postdoctoral appointments will be for three years each and one will be for a four year appointment (a total of 10 FTE over 5 years). The one PhD student will have a four year appointment. The ambitious nature of this project requires a large team of both observational and theoretical postdoctoral scholars and PhD students to complete the proposed research. The P.I. is not a current member of academic staff and therefore has no responsibilities extending beyond research. As such, the P.I. is charged at 100% and, if successful, will focus solely on the aims of the project. Again, this will be necessary to achieve all our goals on the given schedule.

SALARIES: The primary expenditure of our project corresponds to salaries in order support the large team necessary for this project. The P.I will be fully involved (project management, scientific analysis, student supervision, postdoc mentorship, proposal writing, communication with external collaborations, and paper writing) and is covered at the 100% level over 5 years. Salaries are determined according to the UoE salary scale: €80.7k per FTE for the P.I, €61.3k per FTE for the PDRAs and €21.1k per FTE for PhD students. The total cost of salaries over 5 years is **€1106k**.

TRAVEL: A major expense is in the form of travel. I expect all group members to disseminate our results in international conference but also to participate in external collaboration meeting (at least one per year). Due to the nature and timing of our proposal, it will almost certainly be critical for the PDRAs to have extended (several week long) visits to the US and ESO Chile. I have allocated thus allocated €10k/year for all members of the group for travel. This level of commitment is necessary as has been proved by the P.I.'s recent and continued involvement with the e.g. US-based surveys (and the benefit to his research fellowship). The total travel budget is **€190k**.

PUBLICATIONS: Our work will be published in international journals such as Nature, Nature Astronomy, Science, Monthly Notices of the Royal Astronomical Society and the Astrophysical Journal. I have allocated €3k/year for the cost of publications. In addition, all papers will be on the arXiv preprint server free of charge. The total publications budget is **€15k**.

EQUIPMENT & CONSUMABLES: I have allocated €10k/person for the initial purchase of a desktop and laptop computer. Consumables are limited to €600/year (for the purchase of back-up drives and other equipment). The total equipment and consumables budget is **€53k**.

ACCESS TO LARGE FACILITIES: We ask for additional funds that are available to cover “access to large facilities”. We request support for the “buy-in” to two of the new surveys, SDSS-V and DESI. The costs here are €184.1k for SDSS-V and €200.1k for DESI. We specifically request access to these funds as it gives our project access to telescopes and data in the North and Southern Hemispheres (for complete coverage of the celestial sphere) and delivers the crucial early spectroscopy that will be vital to train, test and build our data science and machine learning codes and algorithms. We emphasise that the science return is ‘exponential’ (rather than ‘linearly’) dependent on the breadth of data available and heralds a brand new regime of “several-survey” or “multi-mission” astronomy. Buy-in allows the two observational PDRAs along with the PhD student to have data access rights here and *would place the P.I. and the University of Edinburgh as the only group and institute in the world to be involved in SDSS-V, DESI, 4MOST, LSST and ESA Euclid and JWST*. The total budget for the access to large facilities is **€384.2k**.

Total budget before facilities costs: **€1,740,974**.

Total budget including facilities costs: **€2,221,349**.

| Cost Category | | | Total in Euro | |
|---|---|---|---------------|------|
| Direct Costs | Personnel | PI | 403,854 | |
| | | Senior Staff | | |
| | | Postdocs | 617,145 | |
| | | Students | 84,545 | |
| | | Other | | |
| | i. Total Direct Costs for Personnel (in Euro) | | 1,105,544 | |
| | Travel | | 190,000 | |
| | Equipment | | 50,000 | |
| | Other goods and services | Consumables | 3,000 | |
| | | Publications (including Open Access fees), etc. | 15,000 | |
| | | Other, incl. SDSS-IV Project buy-in, DESI Project buy-in, Audit, Recruitment. | 413,535 | |
| | ii. Total Other Direct Costs (in Euro) | | 671,535 | |
| A – Total Direct Costs (i + ii) (in Euro) | | | 1,777,079 | |
| B – Indirect Costs (overheads) 25% of Direct Costs (in Euro) | | | 444,270 | |
| C1 – Subcontracting Costs (no overheads) (in Euro) | | | 0 | |
| C2 – Other Direct Costs with no overheads (in Euro) | | | 0 | |
| Total Estimated Eligible Costs (A + B + C) (in Euro) | | | 2,221,349 | |
| Total Requested EU Contribution (in Euro) ⁶ | | | 2,221,349 | |
| For the above cost table, please indicate the duration of the project in months: | | | | 60 |
| For the above cost table, please indicate the % of working time the PI dedicates to the project over the period of the grant: | | | | 100% |

The P.I. will spend 100% of their time on the project, which will include achieving the science objectives, managing and supervising personal, as well as the associated logistical overhead time commitments.