Cambridge Astronomy Graduate Student Hack Week 2019

This document is a request to the Management Group to allocate funding for the Cambridge Astronomy Graduate Student Hack Week 2019. The document motivates the purpose for the meeting and discusses its benefit to participants, details the meeting's structure, overviews participation and logistics, then offers a proposal for funding and for computing resources to support the event. It is organized as follows:

1) Meeting rationale
2) Meeting utility for participants
3) Attendance
4) Meeting format and schedule
5) Meeting preparations
6) Funding requests
7) IT resource usage

I thank the Management Group in advance for your consideration of the funding for this meeting.
— Jeff Jennings, Hack Week Organizer
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1) Meeting rationale

The Cambridge Astronomy Graduate Student Hack Week ('hack week') is a meeting that will bring together astronomy Ph.D. students from the Institute of Astronomy, Kavli Institute for Cosmology and Cavendish Astrophysics. Together the hack week's participants will pose, address and share the results of (through submission to a peer-reviewed journal) a tractable but novel and insightful research project. The hack week has two fundamental goals that have motivated its inception.

The first is an exercise in collaboration — with participants coming from a diverse range of subfields and bringing a broad distribution of skills — to both better familiarize young astronomers with this crucial aspect of professional research and to demonstrate the utility of such a joint endeavor to the broader research community. The hack week is similar in structure to Astro Hack Week 2019 hosted in August 2019 by the Kavli Institute. The proposed hack week focuses further still on collaboration, with the schedule comprised solely of group discussions amongst all participants and smaller breakout working groups in which participants conduct research then and there, together.

The second goal is a meeting which is student-centric. The hack week's participant list is composed exclusively of (local) Ph.D. students, and the meeting's organizer and lead is a peer. This meeting is an opportunity for local postgraduates to not only work together but to conduct research as independent, self-sufficient astronomers. Supervisors are absent from the hack week to allow, and motivate, local Ph.D.s to work in the autonomous capacity they will face as post-doctoral researchers.

On both fronts, the hack week aims to deliver practical benefits to its participants to advance their training as astronomers (detailed in **Sec.2**).

It is the organizer's hope and intent that this will be the first of an annually recurring Cambridge Astro Grad Hack Week. Should this pilot hack week be successful, the organizer and other interested postgraduates will lead the second annual hack week in Michaelmas Term 2020.

2) Meeting utility for participants

In addition to the broader practical goal of producing a peer-reviewed publication co-authored by all participants, the meeting is designed to develop a small but important set of practical skills for participants. These are:

- Knowledge transfer. The hack week is not within the purview of a specific field in astronomy. It is instead focused on the practical and technical skills participants from multiple fields can leverage against a common problem. Importantly, this facilitates exchange of ideas and techniques in a broader context than individuals typically experience when attending a conference or meeting specific to their field. The hack week will expose participants to skills they can subsequently learn to greater depth (alongside their peers who are also hack week participants) and apply to their own research.

- Experience working jointly on a project with many (20) collaborators. The hack week is highly interactive, forgoing lectures for group discussion and breakout activities among smaller working groups *at all times*. As such participants will become more familiar with and capable in fairly large-scale, time-intensive collaborations with several peers of diverse background and expertise. This helps participants appreciate how to balance their perspectives with others' and how to compromise in order to move forward together on a joint project.

- Familiarity conducting work as independent researchers. The hack week is composed entirely of and led by Ph.D. students. The week spans (see **Sec.4**) individuals proposing project ideas, critically assessing and discussing these together to reach a consensus, choosing how to pursue without guidance from advisors, and coming together at the end to draft and submitted a publication. This amount of autonomy and work conducted only amongst peers will aid participants in the ultimate goal of the Ph.D., becoming self-sufficient, independent researchers.

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3) Attendance
The meeting will bring together 19 local postgraduate astronomy students (in years 2 - 4 of the Ph.D.) composed of members of the Institute of Astronomy, Kavli Institute for Cosmology and Department of Applied and Theoretical Physics. These include 15 in-person and 4 remote (local students who are traveling or otherwise unable to attend in-person) participants.

Attendees (sorted successively by Department, year and alphabetically):

IoA
Laura Rogers - 4th year
Matt Temple (remote participant) - 3rd year
Adam Langeveld - 2nd year
Adam Marshall - 2nd year
Andy Everall - 2nd year
Cat Sinclair - 2nd year
Jake Bennett - 2nd year
Jeff Jennings - 2nd year
Jess Rigley - 2nd year
Josh Lovell - 2nd year
Matt Nixon - 2nd year
Rosie Talbot - 2nd year
Zephyr Penoyre - 2nd year

Kavli
Anton Baleato - 3rd year
Fruzsina Agocs (remote participant) - 2nd year
Joris Witstok - 2nd year
Roger De Belsunce (remote participant) - 2nd year

DAMTP
Elliot Lynch - 2nd year

External
Namrah Habib (remote participant) - Oxford, 1st year (formerly IoA, MPhil)

Gender ratio: 6 / 19 = 32%

4) Meeting format and schedule
4.1 — Brainstorming day
The hack week is prefaced by a brainstorming day to take place two weeks prior. The brainstorming day will be used to choose a project to be undertaken over the course of the hack week. The brainstorming day will consist of presentations from individuals who have previously submitted 1 - 2 slides to suggest a project (these have already been solicited), followed by a group discussion on which project to pursue. Participants will then together draft a framework for how to approach the project over the hack week. The two week gap between the brainstorming session and hack week was chosen to give participants time to think about the project and how they will contribute during the hack week.

Importantly the meeting organizer already has a project idea that will be presented among the options during the brainstorming day. Thus there is assurance that a well-defined project will be undertaken during the hack week. This specific project has been designed to be self-contained over the course of the hack week, emphasize practical and technical skills rather than background knowledge in a specific domain of astronomy, and benefit from a broad diversity and large number of participants. The project's subject is in brief constructing a phylogenetic tree (though in a more accessible form) of research in all of astronomy to discern the relative amount of collaboration within and between groups and fields. Scraping the arXiv and anonymizing the results, the project will assess by citation metrics where collaboration has been undertaken (where two divergent branches on the phylogenetic tree have reconverged) and whether this has been advantageous relative to an absence of collaboration. The project's goal is to show (if supported by the data) that more frequent and broader collaboration than is currently practiced is advantageous to research in astronomy as a whole. This idea was the motivation for bringing together participants from all backgrounds for the hack week and for the meeting leading to a publication with a diverse author list of individuals entering the field.

4.2 — Hack week
Over the course of the hack week all participants will work together on the project. Each day consists of participants breaking into smaller working groups (designed around individuals' specific interests and skillsets) to progress specific aspects of the project. The organizer will 'float' between the working groups throughout the day to understand the state of progress, identify barriers to it, and suggest connection between individuals in separate working groups to efficiently cross these barriers. All participants will convene for a group discussion at the start, midpoint and end of the day to discuss progress and coordinate next steps. This ensures the project is moving forward efficiently and identifies bottlenecks immediately to reallocate time and resources as needed. The organizer will at the close of each day assess that day's progress and discern any advantageous alteration to the following day's schedule and/or working group compositions to efficiently leverage time.

The final day of the hack week will be structured uniquely to bring work across all working groups into a cohesive whole. If the meeting's outcomes are sufficient to warrant publication, participants will begin drafting a manuscript on the results. We will then allocate further work on the manuscript amongst the participants such that its progress will not stagger. The target, to which the organizer will adamantly strive to ensure we adhere, is submission of the manuscript to a peer-reviewed journal within two weeks of the beginning of Lent Term 2020 (14 January).

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4.3 — Daily schedule
The schedules for the brainstorming day and hack week follow.

<u>Brainstorming day, Monday, November 11, 10:00am - 5:00pm, Hoyle HCR</u>

10:00am - 12:15pm:	Project idea proposals, discussion on which to pursue
12:15 - 1:00pm:	Lunch
1:00 - 3:30pm:	Discussion on which project to pursue, how to approach it over the hack week
3:30 - 4:00pm:	Tea
4:00 - 5:00pm:	Concluding discussions. Set plans for hack week

<u>Hack Week, Monday, November 25 - Friday, Nov.29, 10:00am - 5:00pm, Hoyle HCR</u>

Daily schedule, Monday - Thursday:

10:00 - 10:15am:	Full group discussion: Goals/plan of each subgroup for the day
10:15am - 12:30pm:	Subgroup work
12:30 - 1:15pm:	Lunch

Wednesday alteration: 11:30am - 1:00pm: Attend lunch hosted by Richard McMahon

1:15 - 1:30pm:	Full group discussion: Subgroup progress updates to full group, everyone's feedback
1:30 - 3:30pm:	Subgroup work
3:30 - 4:00pm:	Tea
4:00 - 4:30pm:	Subgroup work
4:30 - 5:00pm:	Full group discussion: Subgroup progress update to full group, everyone's feedback. Set plans for following day

Schedule, Friday:

10:00am - 12:30pm:	Full group discussion: Bringing the work from all subgroups together, outlining the manuscript
12:30 - 1:15pm:	Provided lunch
1:15 - 3:30pm:	Drafting sections of the manuscript
3:30 - 4:00pm:	Tea
4:00 - 5:00pm:	Set next steps on manuscript, including timeline and delegation

5) Meeting preparations
Registration for the meeting has closed, and the participant list is finalized. Attendees have been notified of the meeting dates/times.

The Hoyle Committee Room has been booked for the brainstorming day (Nov.11) and hack week (Nov.25-29).

The organizer has set up a dedicated Slack workspace, Github repository, Datalore real-time collaborative Python environment, and Overleaf document for use during the brainstorming day and hack week to ensure effective and efficient collaboration.

A call for project ideas has been issued to attendees. A reminder solicitation will follow 1 week prior to the brainstorming day. As discussed in **Sec.4.1**, the organizer has a well-defined project that will be proposed alongside others. In the event other ideas are not submitted (or if the organizer's idea is selected by attendees), this project be the focus of the hack week and will ensure the scope of the meeting is directed and the participants' time spent productively.

6) Funding requests
<u>Food/drink</u> - **£590 total** (average £118 / day) **for lunch on 6 days: Nov.11, Nov.25-29**

The meeting will be held from 10:00am - 5:00pm daily and will be intensive. Participants will attend the standard IoA afternoon tea (3:30pm - 4:00pm), but will otherwise be heavily focused on the meeting's work throughout each day. As such it would be greatly helpful to provide lunch to the 15 local participants on the brainstorming day and during the hack week (6 days total). This constitutes the whole of the requested amount.

The cost was determined assuming 2 days' lunch delivered from The Pizza Company (£70 / day) and 3 days delivered from Aromi (£150 / day). The motivation for 2 different restaurants is to alternate between them over the hack week to give participants variety. The intensive schedule entails a limited, fixed time available for lunch. For this reason the organizer chose restaurants that have a reliable record of timely delivery.

The organizer feels this is a reasonable funding request given the scale of the meeting, both in terms of the number of participants it engages and its benefits (as outlined in **Sec.2**) to Ph.D. students in the local astronomy departments. If the Management Group does not find this request tenable, but a lesser amount feasible, the organizer (and meeting participants) would of course still be grateful for this support.

Per **Sec.4.3**, lunch is scheduled for 12:15 - 1:00pm on Nov.11 and 12:30 - 1:15pm on Nov.25-29. If members of the support staff are available to meet the food delivery personnel and set up lunch 15 minutes prior to the scheduled time outside the Hoyle HCR each day and clean up afterward, we would be very grateful. If they are not available, the meeting organizer will coordinate with peers to manage this.

7) IT resource usage

<u>Laptops for remote participants</u> - **Use of 4 laptops for 6 days: Nov.11, Nov.25-29**
These have been arranged for loan over the workshop dates by Helpdesk.
Four remote participants will be attending via video conferencing (Google Meet) as arranged by the meeting organizer. The nature of the meeting will be modular, with participants separating into smaller working groups to undertake specific tasks. As such it is ideal for the four remote participants to each have a designated screen (laptop) so that they can individually participate in smaller group work. The laptops only need internet access and ability/permission to use the webcam/microphone.