BRIMACOMBE PI Request to Restart Research: Phase I only

Complete this form and submit to John Madden (ampel.dir@ubc.ca) cc'ing Gary Lockhart (Gary.Lockhart@ubc.ca) in order to request approval for restarting research. SBQMI members please also copy Andrea Damascelli (andrea.damascelli@ubc.ca) and Pinder Dosanjh (dosanjh@phas.ubc.ca). Please also cc your department head or appropriate departmental contact. Once approved, complete and sign the Access Agreement (sent to you separately) and have it posted on each exterior lab door.

Applications will be accepted immediately. The re-opening date will depend on approval of faculty level restart plans, in addition to the time taken to review applications. Additional forms and approvals may also be required.

Name:_Sarah Burke and Doug Bonn_____

Department/Institute:__Physics&Astronomy and SBQMI_____

Email:_saburke@phas.ubc.ca; bonn@phas.ubc.ca_____

Phone#:_[redacted]_____

Standard hours of return: Phase I occupancy 7 AM to 6 PM Monday to Friday.

1. Briefly outline proposed experiments/research that require on-campus access:

Experiments that require on-campus access include scanning tunneling microscopes (STM) in the basement of AMPEL, a small molecular beam epitaxy (MBE) system in room 145, and microwave spectroscopy apparatus in room 145. There is a room temperature STM in 145 that will not be started in Phase I. Amongst the basement STMs, the experiments are: (1) a study of quasiparticle interference in Fe-based superconductors in the dilution refrigerator STM; (2) a study of NbIrTe4 in the Omicron STM; (3) a study of Sr2IrO4 in the Createc STM; and (4) a study of Li induced distortions in graphene in the Tesla STM. All of these had ongoing experiments shut-down in mid-stream in March.

(1) The dilution refrigerator STM experiment has a very gradual restart, owing to the nature of the low-temperature apparatus, which takes a week to cool, testing, and sample preparation time. This will require substantial in-person work at the beginning, less during the cool-down phase, and only occasional visits (as little as once per week) once running and operated remotely. Experiments will be a critical first science result for an instrument that has been many years in development, and provide a new (Sept 2019) graduate student with first data to work with.

(2) The Omicron STM can be cooled down and started much more quickly, but due to its ~50hr cryogen hold time, will require off-hours access since it cannot remain cold over a weekend that begins early

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Friday evening and ends Monday morning. If it is able to start in these circumstances, experiments on a collaborative project on NbIrTe4 will continue following extremely promising initial data. This will provide content for a paper for a 1st year PhD student and a postdoc entering 3rd year in the LAIR. Two other projects also require additional data to write papers, but as these will require more time on-site, these will wait until a later stage of reopening.

(3) The Createc STM can also be cooled down and started relatively quickly, with less than a week of intermittent in-person work, before it is cooled down. After this, the work on iridate samples will re-start, looking at sample-dopings that will complete the data set for an upcoming paper based on several months of work in the fall/winter. This paper is important for career progress for a postdoc and a PhD student near completion. Once in measuring mode, it needs in-person attention only for cryogen filling every 3 days, and for sample or tip changes.

(4) The Tesla STM has a similar restart schedule to the Omicron and Createc, but once it enters remote measurement mode, has a relatively long cryogen hold time meaning in-person work is needed as little as two visits per week. The return to an experiment on in situ surface doping of graphene is essential for the completion of Amy [redacted] thesis research, complementing her prior ARPES work in the Damascelli group. Amy is near the end of her PhD and had planned to finish at the end of this year; the COVID shutdown came just as this instrument was ready to run again after some repairs and a long commissioning period impacting her work significantly and extending her time to completion.

Upstairs in room 145, the microwave apparatus is waiting to continue a series of runs on PdCoO2. This experiment is an MPI/UBC-Dresden collaboration in the fast-moving area of hydrodynamic electron flow in high-mobility materials, with a result that is very close to complete enough for publication. This experiment has a fast start-up time but requires considerable in-person presence since cryogens must be filled daily and it is not automated for operation from home. It can however typically be run solo and is in a room with ample space for social distancing. This instrument does require twice-daily top-up of cryogens to run efficiently, so there is a need for brief attendance in the lab in the evening, outside of ordinary working hours.

Also, in room 145 is an MBE system that just reached the phase of initial tests for a first sample growth. It requires only a couple of days of in-person work before a lengthy bake-out period that will require only occasional checks by whoever is working in 145, and this will consume the majority of the Phase I start-up period. Using this initial time to get the bake going will enable an efficient step towards a first film growth in Phase II.

2. Building name: Brimacombe

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3. For each room occupied by the PI, indicate the room number, the total number of personnel who usually work in that space, the total number of personnel who need to access the room, and the maximum number who will work in the room at once. Note that UBC is aiming for 1/3 occupancy of spaces during Phase 1, and that there must be space for physical distancing.

Room #	Total # of personnel (usual)	Total # of personnel who need access to the space	Max. # at one time during Phase 1
47	7	6	2
48	6	6	2
61	3* (new lab only at ¼ long-term occupancy)	2	2
145	11 (6 regulars + 5 intermittent)	11 (3 regulars + 8 intermittent)	5 (3 regulars +2 intermittent/rotating)

The **total maximum** personnel present in these rooms altogether will be no more than **8**, noting that there is double-counting in some of the individual maxima in the table above. The instrument in room 61 in the new basement will have tasks where 2 people need to be present, and these people may occasionally need to go upstairs for tasks in room 145. At any given time, only 1 pair will be working on one of the three instruments in room 47. Sometimes these team members will need to move to the control room 48 and sometimes they will need to go upstairs for tasks in room 145. There may upon occasion be 1 person working in the control room 48, while a pair are working with an instrument in room 47, but the total in rooms 47+48 will never exceed 3.

4. Is your lab space shared? Yes / No

Sarah Burke and Doug Bonn run weekly joint group meetings (as well as daily small-group meetings) and a highly active shared Slack group. Weekly schedules will be reviewed during group meeting and any issues regarding prioritization determined through these and separate discussions.

5. Describe how you will ensure physical distancing within your lab.

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Time on-site will be minimized through remote access of the experiments as much as possible. This applies particularly to the basement lab spaces (47, 48, 61). The few periodic or intermittent tasks requiring on-site access in the basement will be scheduled to avoid overlap of paired teams and maintain the reduced maximum occupancy for each space. In particular, the instruments housed in pods in room 47, as well as the connecting antechamber and service corridor, are all small spaces with a single entrance. Work around the equipment will require attention to physical distancing, and will be restricted to 1 user whenever possible; in cases where 2 people are required to complete a task that may breach 2m we will follow the protocols described below using additional PPE and maintaining paired teams to limit the number of contacts over time. There will not be more than one pair working in room 47 at any given time. Room 61 follows a similar protocol, but there is only one instrument there, which naturally limits overlap, but needs similar attention to social distance around the instrument and the use of PPE when that is not possible. The other narrow space with potential overlaps is the control room 47. This room has 3 well-separated workstations and two exits at the far ends of the room. There will be no more than two people in the room at a time, at separate workstations, and using opposite entrance. Work in rm. 145, a large and more open space, involves two apparatus that require more attention in-person. There is abundant room for one person each on these instruments and when an extra person is needed for certain tasks, the same protocols described below will be used to limit the number of contacts. On the basement instruments, there are times when there is a significant waiting period between tasks. Personnel may use the shared office space in room 282 during these times, provided they do not exceed a total occupancy of (what are allowed here? 3?).

6. How will you schedule occupancy of your lab space? Phase I occupancy 7 AM to 6 PM Monday to Friday. *e.g. online sign up, weekly discussion in lab meeting to prepare a schedule together, other?. Ensure that people on the same shift are not in conflict for the same resources in their own lab. Include an example plan with the application. Schedules should be posted on the lab door weekly.* ***Note:*** *at any one time, UBC is aiming for* ***ca. ⅓ occupancy*** *during Phase 1. If you request after hours access, this should be thoroughly justified here*.

We have set up an online calendar to book time in each space and ensure the maximum occupancy is not exceeded. This schedule has sufficient detail to avoid conflicts over shared resources across multiple rooms. This will be reviewed each week during group meeting but may be adjusted to respond to experimental needs if the space is available. The calendar will also be used to designate one person responsible each day for ensuring compliance with the procedures and occupancy limits outlined in this document.

7. Outline plans to address working alone regulations.

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We have laboratory procedures for working alone that comply with UBC recommendations, and our laboratory tasks do not require special attention to working alone and check-ins. However, as an additional measure recognizing that fewer people will be in the building while striving to reduce any COVID transmission opportunities: some tasks (e.g. cryogen filling, hydrogen torch use, etc.) will still require a physical buddy to remain in the space (or adjacent space with line of sight and at an audible distance), all other work will require at least a virtual buddy (e.g. via video call, phone call, or for lower risk work before/after check-in), preferably with someone on site or with contact information for someone on site.

8. Identify high-contact points that need to be sanitized (doorknobs, fridge handles, switches, communal keyboards, work surfaces, chairs etc.) and all multi-user instruments and equipment in your lab(s), their location, sanitization protocols: this includes items only used by your lab group. The protocols should be posted as a checklist at the entrance for research personnel to complete before and after each shift.

Personnel will use a disinfectant to clean all tools after use and in addition we note high-contact points that will be cleaned with disinfectant at the start and end of each shift. The high contact lists below will be posted as checklists at the door to remind personnel and maintain records.

145A (technical workspace):

- Main doorknob to 145
- Microscope, as outlined in protocols below
- Doorknob to 145A
- Desktop of laminar flowhood (145A)
- Keyboard and mouse for ZEISS microscope computer (145A)
- Desktop for ZEISS microscope computer (145A)

Leak detector:

- Currently located in the chase outside of 145. Gloves must be worn while using this equipment AND touch screen must be wiped down after each use.

Createc:

- Main doorknob and doorknob to lift in antechamber (47)
- Doorknobs and locks to Createc pod (47/47C)
- Light switches outside of Createc pod (47/47C)
- Keyboard and mouse for control computer in the control room (48)

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- Desktop for the control computer in the control room (48)
- Control room chairs (48)
- Up/down control buttons for the lift, to move cryogens in/out (47)
- Handles and valves on LN2 and LHe dewars (47 and Highhead)
- Rubber hoses for LN2 dewars (47)
- Cryogen transfer siphons (47C)
- Outer cryogen shell (Used for support when standing on Createc to fill) (47C)
- Coarse motion controller (47C)
- High zoom camera (47C)
- Any valves on turned on instrument during standard operations (Approximately 10, only selectively used during certain operations) (47C)
- Valves on He and N2 gas cylinders (Service corridor behind instrument pods)

Omicron:

- Main doorknob and doorknob to lift in antechamber (47)
- Doorknobs to Omicron pod (47B)
- Light switches outside of Omicron pod (47B)
- Keyboard and mouse for control computer in the control room (48)
- Desktop for the control computer in the control room (48)
- Up/down control buttons for the lift, to move cryogens in/out (47)
- Handles and valves on LN2 dewars
- Handles and valves on LHe dewars

Beast:

- Main doorknob and doorknob to lift in antechamber (47)
- Doorknobs to Beastpod (47A)
- Light switches outside of Beastpod (47A)
- Keyboard and mouse for control computer in the antechamber (47)
- Desktop for the control computer in the antechamber (47)
- Keyboard and mouse for control computer in the control room (48)
- Desktop for the control computer in the control room (48)
- Up/down control buttons for the lift, to move cryogens in/out (47)
- All handles and valves on LN2 dewars

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Tesla:

- Doorknobs to vaultway (61)
- Doorknobs to pod (61B)
- Button/chains on lift to QMI extension
- Keyboard/mouse for control computer in vaultway
- Handles and valves on LN2 dewars
- Rubber hoses on LN2 dewars
- Handles and valves on LHe dewars
- Touchscreen on instrument controller
- Siphons for cryogen transfer
- Handheld controller for the instrument

Any use of the shared office space room 282 will be followed by cleaning keyboard and mouse with disinfectant, as well as entry door handles.

Shared microscopes will be cleaned following the attached protocol.

Cryogen filling protocol now includes before/after sanitizing of transfer siphons, dewars, and other tools (see attached SOP).

9. Are there any tasks where physical distancing cannot be maintained? Yes / No

If yes, describe the task, explain why it is important to perform in the coming month, and describe the frequency and duration of tasks. What safety measures will be taken to mitigate risks?

Cryogen filling: every 2.5, 3, or 5 days depending on the instrument, duration 1-2hr for refilling (1-2 work days for initial cooldown; initial cooldown for each instrument will be spaced apart to avoid overlap). Paired teams will be used to reduce the number of contacts. Additional PPE will be used, and PPE will not be shared. Equipment will be sanitized before and after use. Time spent within 2m will be limited to the brief time required when inserting/removing the transfer siphon (note: this is already part of our safety protocol regarding asphyxiation hazard). See attached modified SOP for detailed safety measures.

Some sample and tip transfers: intermittent – required at initial restart, then anywhere from weekly to once every 2-3 months. Experiments are being planned that do not require frequent sample preparation and transfer, to reduce the frequency of these tasks as much as possible while still making progress. Time spent within 2m will be limited to the minimum time possible. Additional PPE will be required (gloves, face-shield) and equipment areas will be sanitized (transfer arms, chamber areas near personnel) before and after tasks.

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10. Is equipment in your lab space used by personnel from other labs? Yes / No

If yes, explain how you will arrange for other users to access this equipment while maintaining physical distancing. How will this equipment be sanitized between users? List the anticipated users below in section 13.

Leak detector use will be pre-arranged, and a contactless drop will be organized. We will sanitize surfaces before and after exchange, and will request the receiving group do the same.

Optical microscope access to other personnel will not be allowed during phase 1 without special request

11. Will you need to access equipment located in other research labs, or your lab equipment housed in shared equipment rooms in your building? Yes / No

If yes, list the equipment or room numbers and how will this be arranged. How will this equipment be sanitized between users?

Samples will be retrieved from the glove box in room 273 and left in 145 for retrieval. These samples must be handled with gloves already.

Epoxies may need to be retrieved from the fridge/freezer in room 273. Wearing gloves will be required to open/close the fridge door and to handle the epoxies.

We may need access to the portable blue crane stored in the second floor closet. This will be arranged with Giorgio and used with gloves. The handles will be sanitized after it is returned to the closet

12. Will you need to access equipment or services in other buildings? Yes / No

If yes, List. e.g. BiF, Chem Stores, Kaiser, Frank Forward, Henning's, …

Access to Chemistry Stores for solvents.

Access to Physics Stores for miscellaneous parts.

13. It is mandatory for Phase 1 that all research personnel have appropriate certified training. Will all personnel from your group accessing the lab be certified prior to having access, including new COVID-19 video training? Yes / No

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Identify each of the personnel below who will require access to on-campus space (information will be attached to the fob access to the building):

[redacted]

14. Explain below how you will prioritize research personnel in your group to access lab space.

Group members working on data analysis and other tasks not needing lab access (including all undergraduate students) will be working from home. The remaining research activities fall into three categories, in order of priority:

1. Experiments under way that require intermittent in-person work to facilitate a continuing data-taking run from home.
2. Experiments requiring extensive in-person attention for an on-going experiment.

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3. Experiments requiring extensive in-person attention to be able to start a new phase or experiment.

Priorities organized via these categories will be discussed between the PIs and the entire group, with further consideration given to factors such as graduation timelines, career paths, and nearness of a result to a complete paper.

I agree to abide by the rules and procedures I have described above during UBC's Phase 1 of research resumption. I acknowledge that failure to uphold the commitment confirmed here could result in the loss of research access privileges. *Signatures of additional PIs who share the space should be added.*

Signed (PI1): Signed

Date: 5-June-2020

Add as needed:

Signed (PI2): Signed

Date: June 5, 2020

Signed

9 June 2020, signed by John D Madden, AMPEL Director to signify AMPEL approval.

Signed

9 June 2020, signed by Colin Gay, Head of Physic and Astronomy, to signify approval Departmental approval

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