

# **Memorandum of Understanding**

**between**

**The Regents of the University of California, as Management and Operating  
Contractor for the Lawrence Berkeley National Laboratory**

**and**

**Kavli Institute for the Physics and Mathematics of the Universe (Japan)**

## **Concerning Collaboration in the Field of Cosmic Microwave Background Radiation (CMB) Experiments**

This Memorandum of Understanding (MOU) is between The Regents of the University of California (The Regents), in its capacity as the manager and operator of the Lawrence Berkeley National Laboratory (LBNL), and the Kavli Institute for the Physics and Mathematics of the Universe (Kavli IPMU).

LBNL is a U.S. Department of Energy (DOE) National Laboratory managed and operated by The Regents pursuant to DOE Contract No. DE-AC02-05CH11231. Kavli IPMU is a Japanese research institute under the University of Tokyo which focuses on research in fundamental physics and mathematics. Both LBNL and Kavli IPMU have established research programs in the field of Cosmic Microwave Background radiation (CMB) and both are institutional members of the Simons Array (SA) and the Simons Observatory (SO) CMB experiments.

The Regents and Kavli IPMU are collectively herein referred to as the “Participants” or individually as a “Participant.”

### **1. Objective**

The Participants intend to explore potential future collaboration in the area of joint development of techniques to promote experiments seeking to understand the nature of inflation and the constituents of the Universe through measurements of the CMB.

### **2. Proposed Areas of Collaboration**

- A. The Participants intend to collaborate in one or more of the following areas:
  - i. Training and planning for future SA and SO experiments to collect CMB data;
  - ii. Exchange of CMB data, including algorithms, simulations and data analysis techniques;

- iii. Exchange of information regarding the potential design and development of detectors, readouts and other types of instrumentation needed for future CMB experiments.
- B. The scope of the planned activities and collaboration described above may be changed by mutual written consent of the Participants.

### **3. Proposed Forms of Collaboration**

The Participants expect to collaborate through mutual visits, the exchange of information, exchanges of researchers and experts, training and planning for potential future joint research, with any future collaborative research to be undertaken only pursuant to an appropriate written agreement therefor.

### **4. Proposed Designated Representatives**

- A. To administer the implementation of this MOU, each Participant should designate one or more principal coordinators to be in charge of the collaboration, through whom all requests and plans of that Participant should be made.
- B. The principal coordinators may hold meetings when necessary to discuss matters related to the collaboration under this MOU.
- C. The principal coordinator for The Regents is Dr. Natalie Roe, Physics Division Director, or, in the alternative, Dr. Akito Kusaka. The principal coordinator for Kavli IPMU is Professor Hitoshi Murayama, Director of Kavli IPMU, or, in the alternative, Professor Nobuhiko Katayama.

### **5. Commencement, Modification and Discontinuation**

- A. Cooperative activities under this MOU may commence upon signature of all Participants and continue for a five (5) year period, unless discontinued in accordance with paragraph B of this Section, or extended in accordance with Paragraph C of this Section.
- B. The Participants may discontinue this MOU at any time by mutual written consent. Alternatively, a Participant that wishes to discontinue its participation in this MOU should endeavor to provide at least thirty (30) days prior written notice to the other Participant.
- C. This MOU may be modified or extended for additional periods by mutual written consent of the Participants.

### **6. Exchange of Information**

- A. The Participants do not anticipate the exchange of any business-confidential information or the creation of intellectual property. If the Participants determine that a particular activity may lead to the exchange of business-confidential information or the creation of intellectual property, they should consult with each other and enter into an appropriate written agreement therefor.

## 7. General Considerations

- A. This MOU does not create any legally binding obligations between the Participants.
- B. Each Participant should conduct the activities contemplated by this MOU in accordance with all applicable laws, regulations and other requirements to which it is subject, including, by way of illustration and not by way of limitation: export control laws; environmental, health and safety laws and regulations; and international agreements to which its Government is a party.
- C. The conduct of cooperative activities contemplated by this MOU is subject to the availability of funding, personnel, and other resources.
- D. Each Participant is to be responsible for the costs it incurs in participating in cooperative activities under this MOU.

Signed in duplicate.

FOR THE REGENTS OF THE  
UNIVERSITY OF CALIFORNIA

By: Michael Witherell

Name: Michael Witherell

Title: Director, Lawrence Berkeley  
National Laboratory

Date Aug. 3, 2017

Place Berkeley, CA, USA

FOR KAVLI IMPU

By: Hitoshi Murayama

Name: Hitoshi Murayama

Title: Director, Kavli IPMU

Date September 20, 2017

Place Berkeley, CA, USA