ND-MAP Proposal

*Objectives.* East Asia is a large and advanced region with multitudes of high school students and teachers who can benefit from learning about particle physics through International Masterclasses. However, there are relatively few masterclasses in East Asia each year. The Notre Dame – Masterclasses Across the Pacific (ND-MAP) proposal is designed to increase masterclass participation through workshops that expose students to particle physics, develop teachers to work with students in particle physics masterclasses, and engage collaborating teachers and university faculty to mentor the masterclasses.

*Background.* The Notre Dame QuarkNet (NDQN) Center has a successful record of effectively bringing particle physics and international masterclasses to colleagues in other countries through the programs of Notre Dame international. In Chile, NDQN has partnered with the Faculty of Physics at Pontificia Universidad Catolica (UC) in Santiago since 2013 over five successive programs: Masterclass Institutes Collaborating in the Americas (MICA) I-V. In these programs, NDQN and UC members have conducted workshops that stimulated the growth of particle physics masterclasses in Santiago and brought particle physics to students who might never have been exposed, from neighborhoods of Santiago to rural schools to the north and south. These efforts also afforded the chance to do interesting cosmic ray studies with QuarkNet cosmic ray detectors which involved Chilean students, teachers, and physicists. NDQN also had a successful set of workshops in Mexico in the CMS Outreach and Science for Masterclass Institutes Collaborating in the Americas (COSMICA) program, in which the Chile model was repeated with great success. In addition to these Notre Dame International projects, the Principal Investigator has facilitated masterclass workshops with students and teachers in China and Japan and cosmic ray workshops in Taiwan and Japan as part of his QuarkNet duties.

*Approach and Methods*. The Investigators of this grant will contact collaborators in Vietnam, Hong Kong, Taiwan, Korea, and Japan to develop a final itinerary of 5 or more workshops. At each venue, the Notre Dame team of two, a local organizer, and one other person will facilitate a 1-2 day “Data Workshop” similar to those presented in Chile and Mexico and to QuarkNet Data Workshops offered across the United States by the PI and his QuarkNet colleagues. At each workshop, teachers will be able to learn particle physics activities, prepare with physicists for masterclasses, and share their own ideas as well as plan future collaboration with Notre Dame and QuarkNet. If possible, the “other person” will be, in most cases, someone who has worked with QuarkNet and teaches in East Asian. For example, Joel Klammer, a very active and capable QuarkNet teacher and Concordia International School Shanghai, would assist in Hong Kong and possibly other countries. Mr. Klammer is also a key collaborator in this grant. The expedition is expected to fit into 10-15 day period. As a bonus, Mr. Klammer speaks some Chinese and the PI speaks some Japanese.

*Anticipated Outcomes.* The main results that we expect and hope for from ND-MAP an increase in East Asian participation in International Masterclasses and the development of nodes which collaborate locally, across East Asia, and with Notre Dame and QuarkNet.

*Overall Schedule*. The table below shows the expected schedule of activities.

|  |  |
| --- | --- |
| **Dates** | **Activities** |
| October 2019 | Proposal |
| November 2019 | Finalize itinerary, prepare for expedition: choose people, arrange workshops, travel. |
| December 2019 | Final preparations. |
| January 2020 | Travel to East Asia, conduct 5-7 workshops from possible venues in 5 target countries. |
| February-April 2020 | International Masterclasses |

*Sample Visit Schedule (Some stays may be longer for additional workshops)*

Expedition in East Asia, PI only, with assistance from local collaborators.

* Day 0-1: travel to Hong Kong
* Days 2-3: planning and workshop in Hong Kong
* Day 4: travel to Hanoi
* Day 5: workshop in Hanoi
* Day 6: travel to Taipei
* Day 7: workshop in Taipei
* Day 8: travel to Seoul
* Days 9: workshop in Seoul
* Day 10: travel to Tokyo
* Day 11: workshop in Tokyo
* Day 12: return to U.S.

*Sample Budget Summary.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Item** | **Quantity** | **Description** | **Unit Cost** | **Net Cost** |
| airfare | 2 | to, from, across East Asia | 2450 | 4900 |
| lodging | 28 | mutl rooms, 2-3 lodgers | 150 | 4200 |
| per diem | 28 | 12 days, 2-3 people | 75 | 2100 |
| stipend | 4 | 4 days, one teacher | 150 | 600 |
| transport | 1 | budget for local transport | 500 | 500 |
| part costs | 1 | budget for teachers | 1500 | 1500 |
| other | 1 | supplies, QN times, misc | 3000 | 3000 |
|  |  |  |  |  |
| *Visit net cost* | |  |  | *16800* |

*Sample Budget, with more detail.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Item** | **Quantity** | **Description** | **Unit Cost** | **Net Cost** |
| airfare | 2 | SBN-HKG/NRT-SBN | 1500 | 3000 |
|  | 2 | HKG-HAN | 200 | 400 |
|  | 2 | HAN-TPE | 250 | 500 |
|  | 2 | TPE-ICN | 200 | 400 |
|  | 2 | ICN-HND | 300 | 600 |
| lodging | 24 | hotel, 12 nights, 2 rooms | 150 | 3600 |
|  | 4 | hotel, 4 nights, 1 room | 150 | 600 |
| per diem | 24 | 12 days, 2 people | 75 | 1800 |
|  | 4 | 4 days, 1 person | 75 | 300 |
| stipend | 4 | 4 days, one teacher | 150 | 600 |
| transport | 1 | budget for local transport | 500 | 500 |
| part costs | 1 | budget for teachers | 1500 | 1500 |
| materials | 5 | workshop supplies | 200 | 1000 |
| misc | 1 | unanticipated expenses | 1000 | 1000 |
| admin | 1 | QuarkNet admin staff time | 1000 | 1000 |
|  |  |  |  |  |
| *Visit net cost* | |  |  | *16800* |