Jefferson Science Associates, LLC
Managing and Operating the Thomas Jefferson National Accelerator Facility
for the U.S. Department of Energy

FY2018 JSA Initiatives Fund Proposal Summary Sheet

Proposal title

The Nature of Hadron Mass and Quark-Gluon Confinement from the Jlab Experiments in the 12 GeV era

Project Start Date (month/year) 01/2018

Project End Date (month/year) 12/2018

(●) New proposal ( ) Renewal

Total funds requested $2,500

Total leveraged support / matching funds. Details of funds must be included in budget proposal. $11,500

To be completed by JSA: Total funds awarded **$2,500**

Principal Investigator (PI) Victor I Mokeev

Institutional affiliation Jefferson Lab, Physics Division, Hall-B
Mailing address 12000 Jefferson Ave Suite 5 Newport News VA 23606-4468
Email / phone # mokeev@jlab.org/+1 757 269 6990

Co-PI (if more than 1, add pages with information)

Institutional affiliation
Mailing address
Email / phone #

Check one category: If PI is a Lab employee, your identification of the appropriate Associate Director below represents the acknowledgement of that AD with your submittal of proposal. No signature required.

(●) Lab employee: Identify Associate Director (email / phone) Rolf Ent ent@jlab.org/ +1 757 269 7373

( ) Lab user: Identify University affiliation (email / phone)
Joint appointee: identify University and Lab division association (email / phone)

( ) Other: Identify Institutional affiliation (email / phone)

Proposal: Attach file with

(1) Executive summary and technical proposal

(2) Synopsis of scientific, educational, technical, and/or business merits, and alignment with and significance to Lab's current program

(3) Proposed evaluation plan to measure success. If this is a request for renewal of funds, assessment of prior year performance,

Your proposal may include letters of endorsement and other supporting information (maximum of 12 pages including this summary sheet and budget sheet)

Budget Proposal

Proposal Title The Nature of Hadron Mass and Quark-Gluon Confinement from the Jlab Experiments in the 12 GeV era

Principal Investigator (PI) Victor I Mokeev

Total funds requested $2,500 **To be completed by JSA: Total funds awarded** $2,500

Item Description		Amount
Equipment. Lab users submitting proposals that include equipment to be used at the Lab must review with the appropriate Lab Associate Director. The provision of the name of the AD below represents the AD's acknowledgement. **No signature required.**		
Associate Director:		
	Subtotal Equipment	$0
Travel Support. Provide break-out of estimates for registration fees, lodging and transportation, catering, and facility charges (room rentals, AV equipment; etc.)		
Air travel support for graduate students and young postdocs	$1,500	
Air travel support for key speakers who have limited funds: $1,000	$1,000	
	Subtotal Travel	$2,500
Supplies		
	Subtotal Supplies	$0
Consultants/Subcontracts		
	Subtotal Consultants/Subcontracts	$0
Other Expenses. Examples include stipends and honoraria, prizes, awards.		
	Subtotal Other Expenses	$0
	Total Budget Proposal	**$2,500**

Budget Justification: Include narrative to explain need for each line item in the budget, showing breakdown of calculations used to arrive at the amount in each line of the budget. Note that the JSA Initiatives Fund Program does not support salaries and salary-related expenses, or indirect expenses.

Leveraged Support/Matching Funds information. Identify the source, type and amount of dollar funds from each institution. Include **separately** estimated value of in-kind support. Your identification of the authorized representative who has committed institutional support for your proposal represents the acknowledgement of that individual. If support or funds are provided by the Lab, identify the associate director (or equivalent) as the authorized representative. Information may be included on separate page.

The requested funds will primarily be used to assist with the travel costs of US participants and to provide support for early-career researchers and for key speakers. Korean Asia Pacific Center for Theoretical Physics (APCTP) will provide all infrastructure for the Workshop and will cover simple refreshments during the breaks between oral presentations, in order to encourage all participants to immediately engage in active discussions of the themes raised therein. Furthermore, APCTP and KNU are working on extension of the financial support in order to provide full travel coverage for the key speakers and local expenses coverage for participants from US and EU. Notably, in our determination to host a successful workshop, the organizers have secured non-JSA funds in the amount of $11500: Jefferson Lab ($2500 R. McKeown, USA), IPN-Orsay ($1000 C.Munoz, France), CEA-Saclay ($1000 H.Moutarde, France), Univ. of Connecticut ($2000 K.Joo, USA), Asia Pacific Center for Theoretical Physics Korea ($5000, Y. Oh, South Korea).

"The Nature of Hadron Mass and Quark-Gluon Confinement from JLab Experiments in the 12-GeV Era"

V.I. Mokeev (JLab, PI), D.S. Carman (JLab), L. Elouadrhiri (JLab), R.W. Gothe (USC),
K. Joo (UCONN),C.-R. Ji (NCSU), C. Munoz (Orsay), H. Moutarde (Saclay),
Y. Oh (KNU), D.G, Richards (JLab), C.D. Roberts (ANL)

Executive Summary: This workshop aims to develop plans and collaborations through which existing and foreseen experiments at JLab can provide insights into the two most important unsolved problems within the Standard Model; namely, the origin of hadron mass and the confinement of gluons and quarks. It will canvass a wide range of experiment and theory, *e.g*. (a) exploring the dynamics and impacts of hadron mass generation with hadron elastic and transition form factors; (b) computation and measurement of the momentum and spatial distributions of partons inside a hadron using new opportunities with DVCS and DVMP experiments in the 12 GeV era, and diverse array of methods in order to expose emergent phenomena via quasiparticle formation, and (c) prospects for contributions from lattice-regularized QCD.

The potential for a combined experiment-theory effort to gather the information necessary to solve the problems of mass generation and confinement has recently been demonstrated in the successful description of JLab data on pion and nucleon elastic form factors, and a number of nucleon resonance electroexcitation amplitudes using continuum bound-state methods. This analysis has unified a large body of experimental results on hadron elastic and transition form factors within a single framework and thereby provided strong evidence to support universality of the dynamically generated dressed-quark mass function, whose existence and behavior are predicted by both continuum and lattice methods. In the absence of quantum effects, the appearance of the non-zero, dynamically generated mass for the proton and other hadrons in the chiral limit of QCD is impossible. Hence, experiment-theory connections that provide confirmation of its existence are plausibly the best means to probe the strong dynamics that lie at the heart of mass generation.

JLab is the only facility in the world today (and for the foreseeable future) that is capable of unravelling the structure of ground- and excited-state hadrons. Indeed, with its 11-GeV electron beam, JLab can utilize a remarkable range of hadron structure parameters that are interpretable in QCD and extracted from experiment– elastic and transition form factors, and a host of parton distributions – that can be used to chart the transition from the Standard Model's perturbative domain, characterized by weak interactions among gluons and quarks, into the domain of strong-QCD, a phase within which all measurable phenomena are emergent and the origin of 98% of the visible mass in the Universe is to be found. Crucially, theory that can directly connect these measurements with QCD is now reaching maturity, so that the data can be mined for the information need to solve the Standard Model's most pressing questions. A remarkable synergy currently exists between the capacities and interests of experiment and

theory; and the purpose of this workshop, therefore, is to gather world-class experimentalists and theorists in order to capitalize on existing successes and foster new collaborative efforts that will lead JLab through the 12-GeV era, and also explore novel avenues for physics at a future electron ion collider (EIC). Existing JLab collaborations, e.g. between JLab and ANL (USA), Indiana Univ. (USA), the University of South Carolina (USA), Irfu/SPhN, CEA, Saclay (France), CNRS/IN2P3, Orsay (France), INFN of Genova (Italy), INFN of Roma (Italy), Geissen Univ (Germany), Tubingen U (Germany), Yerevan Physics Institute (Armenia), Moscow State University (Russia), Boskovic Institute (Croatia), and the Asia Pacific Center for Theoretical Physics (Korea) will be strengthened and new teams will be built, involving scientists from Korean universities and research institutes, in particular. We expect the discussions to be lively and productive, and we will encourage the participation of early-career researchers, whose future depends heavily on the successes we can achieve now and build upon with an EIC.

Support: This Workshop is supported by the JLab Physics Division (Experimental Halls A, B, C) and the JLab Theory Center ($2500), and has secured financial and scientific support from the international hadron physics community: University of Connecticut (USA) ($2000); University of South Carolina (USA); Irfu/SPhN, CEA, Saclay (France) ($1000), CNRS/IN2P3, Orsay (France) ($1000), INFN, Roma (Italy) and Asia Pacific Center for Theoretical Physics (Korea) ($5000).

Synopsis:

This four-day workshop: *"The Nature of Hadron Mass and Quark-Gluon Confinement from JLab Experiments in the 12-GeV Era"*, will gather a select group of hadron-physics world experts and early-career researchers in order to accelerate progress toward a solution of the two greatest puzzles in the Standard Model; namely, the origin of hadron masses and gluon and quark confinement, using data acquired at JLab in the 12 GeV era. It will share themes with, but expand upon the reach and scope of, a series of meetings held during the past five years: JLab/INT workshop *"Twin Approaches to Confinement Physics: Experiment and Strong QCD"*, March 12-15, 2012 (www.jlab.org/conferences/confinement/), JLab Workshop *"A New Era for Hadro-Particle Physics"*, June 23-24, 2016 (www.jlab.org/conferences/hadro-particle/), Temple University Workshop *"The Proton Mass. At the Heart of Most Visible Matter"*, March 28-29, 2016 (phys.cst.temple.edu/~meziani/proton-mass-workshop-2016/), and the related April 3-7, 2017 ECT* workshop (http://www.ectstar.eu/node/2218), and INT Workshop "*Spectrum and Structure of Excited Nucleons from Exclusive Electroproduction*", November 14-18, 2016 (www.int.washington.edu/PROGRAMS/16-62w/). "Nucleon and Resonance Structure with Hard Exclusive Processes," May 29-31, 2017 (https://indico.in2p3.fr/event/14398/). We will capitalize on the developments following this meeting in a workshop at Lab in 2019.

This workshop represents a significant new step toward establishing a true collaborative effort that is focused on the exploration and explanation of emergent QCD phenomena and will bring together groups of experimentalists and theorists involved in studies of a large array of problems relating to hadron structure. Roughly 40 scientists from various international institutions will participate, ensuring that a comprehensive spectrum of researchers from around the world are present to discuss theoretical and experimental strategies for determining the physics underlying the origin of mass and gluon-quark confinement as it is informed by experimental results on the structure of hadron ground- and excited-states. An international advisory committee is being consulted by the organizers in order to finalize the program. The broad international interest for a workshop of this kind is reflected in the large number (more than 20) of key experts who have indicated their desire to participate and in the financial commitment of substantial non-JSA resources.

Scientific Background: The strong coupling regime of QCD (sQCD), where the gluon-quark running coupling is of order unity, defines the last unfinished chapter of the Standard Model. Remarkable differences between sQCD and electroweak interactions make the study of sQCD dynamics the most challenging and important direction in contemporary Standard Model physics. For example, gluon-quark confinement and hadron mass generation are simply invisible in the QCD Lagrangian and any perturbative analysis thereof; they are twin emergent phenomena in sQCD, whose understanding will reveal the origin of more than 98% of the visible mass in the Universe and go a long way toward explaining the absolute stability of the proton. Whatever is the case, they have a profound influence on the composition of nucleons and nuclei. It is therefore crucial that hadron physics accept the challenge of obtaining a body of data whose understanding requires the use of nonperturbative methods that can relate it directly and reliably to the Standard Model Lagrangian and thus deliver a solution to sQCD.

Experiments in JLab Halls A and C have considerably extended our knowledge of pion and nucleon elastic form factors for $Q^2 < 8.5$ GeV^2, providing unprecedented results for the G_E/G_M ratio and the pion form factor determined to Q^2 of 2.5 GeV^2. The results on the $N \rightarrow N^*$ transition electromagnetic amplitudes were obtained for almost all excited proton states in the mass range below 1.8 GeV from exclusive meson electroproduction data measured in JLab Hall B with the CLAS detector. This wealth of experimental results on hadron structure from JLab makes it possible to explore the dynamics behind the mass generation for the first time by confronting the experimental data on electromagnetic elastic and transition form factors with the expectations from theoretical approaches with a traceable connection to QCD that are relevant for the sQCD regime. The JLab experimental results on pion and nucleon elastic form factors, and also transition amplitudes to the electroexcited $\Delta(1232)3/2^+$ and $N(1440)1/2^+$ resonances were successfully described using continuum methods for the QCD bound-state problem that reliably express the running of QCD's coupling and masses. This success conclusively demonstrated that the adoption of a dressed quark mass function emerging from QCD could describe experimental results on electromagnetic form factors. Consistent results

on the quark mass function from independent studies of the pion and nucleon elastic and transition form factors has validated claims that this quantity can be accessed in an almost model-independent way.

Lattice QCD (LQCD) is making progress in describing hadron structure and interactions in the strong coupling regime via direct numerical simulations of the QCD action. Recently, JLab's LQCD group observed the emergence of low-lying meson resonances in production amplitudes evaluated straight from QCD as singularities in the complex energy plane. Photo- and electroproduction amplitudes for the ρ-meson in the processes $\gamma\pi \to \pi\pi$ were obtained in a regime in which the pion mass is around 400 MeV. An extension of these efforts to evaluation of the $\Delta(1232)3/2^+$ electroexcitation amplitudes for $Q^2 < 2.0$ GeV^2 represents the next important major step. Once such calculations reach the true pion mass and when more than one final-state meson can be taken into account, LQCD will be able to describe the full complexity of hadron structure, accounting for all contributing components. LQCD's prospects to shed light on hadron mass generation and the emergence of confinement will be a focus of the workshop.

In upcoming experiments with an 11-GeV electron beam in Halls A and C, data on the pion and nucleon elastic electromagnetic form factors will be extended to $Q^2 \approx 9$ GeV^2 and 18 GeV^2, respectively. In addition, the CLAS12 detector in the upgraded Hall B possesses the unique capacity to explore meson electroproduction off the proton up to $Q^2 < 12$ GeV^2, the highest photon virtualities ever achieved in exclusive reactions. The experimental data from CLAS12 will enable determination of the electroexcitation amplitudes of most excited nucleon states in the still largely uncharted range 5 GeV^2 < Q^2 < 12 GeV^2. Analyses of all these anticipated JLab results using the most up-to-date theoretical tools will allow, for the first time, an exploration of QCD's running coupling and masses at those length-scales that seem to be associated with more than 98% of the measured mass of hadrons, addressing one of the most important open problems in the Standard Model.

In a remarkable twist of Nature, owing to fundamental symmetries in the Standard Model, the momentum-dependence of the dressed quark mass almost completely determines the pion's bound-state amplitude, via a rigorous Goldberger-Treiman relation, that is independent of renormalization scheme and gauge. Consequently, studies of the pion elastic form factor and the pion structure function using the Sullivan process, planned in Halls A and C, offer a clean way to observe the impact of dynamical chiral symmetry breaking (DCSB), as it describes dressed-quark mass generation and the pion wave function. Furthermore, data on the electroexcitation amplitudes for parity partners, ***e.g.*** $\Delta(1232)3/2^+$ versus $\Delta(1700)3/2^-$ and others, will shed new light on the manifestations of DCSB in the spectrum and structure of nucleon resonances, and also on issues relating to chiral symmetry restoration in highly excited systems.

Studies of GPD and TMD structure functions from DVCS, DVMP, and other semi-inclusive meson electroproduction processes represent a key direction in the JLab experimental

research efforts of the 12-GeV era. These studies represent a new step in the exploration of ground-state nucleon structure, offering insights into 3-dimensional parton distributions. Furthermore, new ideas in lattice QCD afford the prospect of the direct calculation of the x dependence of GPDs encapsulated in the study of quasi- and pseudo-distributions, in contrast to previous calculations of the x-moments; the exploitation of these ideas is an important focus of the nuclear lattice community. The possibilities to extend the GPD concept for the $N \rightarrow N^*$ transitions will be discussed at the Workshop. The first moment of the GPD structure function *H*, determined in a wide range of the Mandelstam variable t, may be related to the mass and pressure distributions in the nucleon. Experimental results on the GPD function *H* from the data obtained with planned DVCS experiments in Halls A, B, and C may serve to visualize aspects of confinement as the balance between the internal and external pressures that stabilize the proton. All GPDs determined from DVCS and DVMP data can be calculated using continuum methods in QCD and related therewith to the same running masses and couplings that were used to describe the pion, nucleon elastic, and $N \rightarrow N^*$ transition form factors. Consistency between the experimental results on all GPDs and the theoretical expectations from the sQCD approaches that reproduce the hadron elastic and transition form factors will deliver an understanding of the strong QCD dynamics behind hadron mass generation. This will provide further insights into the emergence of confinement encoded in the strong momentum dependence of QCD's effective charge and its saturation at infrared momenta.

JLab in the 12-GeV era will open up unique opportunities to explore the strong QCD regime via experimental studies of hadron structure in exclusive electroproduction processes carried out within an unprecedentedly wide range of the photon virtualities. The success of these studies depends on the existence of a productive, synergistic effort between experimentalists and theorists. The purpose of this workshop is to foster such collaborations and build a team capable of fully exploiting the exciting opportunities that JLab-12 will provide in order to advance the boundaries of knowledge at the hadron physics frontier and help close the sQCD chapter in the history of the Standard Model.

Scientific Topics: The workshop will canvass a comprehensive range of hadron physics topics (experiment and theory), with an emphasis on hadron elastic and transition form factors, and parton distributions in one- and three-dimensions, in their numerous guises. Its unifying theme is the development of methods to expose and understand the strong QCD dynamics behind mass generation, and gluon and quark confinement. Basic themes will include:

- Experimental studies of ground-state hadron form factors and their relation to PDAs;
- Excited nucleon structure from exclusive meson electroproduction data;
- Opportunities in the 12-GeV era for charting ground state nucleon structure in three-dimensions;
- Contemporary quark models and their role in understanding strong QCD;

- Refinement of continuum methods in order to provide direct connections between experimental observations and QCD, and draw insights from experiment into the origin of mass and gluon-quark confinement;
- Prospects for lattice QCD in the prediction of hadron structure and interactions;
- Impact of these efforts on expanding the science case for an EIC.

Framework, Venue, and Date: This four-day workshop will be held at the Asia Pacific Center for Theoretical Physics in Pohang, Korea, https://apctp.org in late-May/early-June, 2018. (Date to be finalized after all funding and logistical support is secured.) So as to facilitate interaction, participation will be limited to roughly 40 people, including experts and a select group of early-career researchers. Several well-known scientists will be invited to deliver theme-setting presentations and lead discussions. We will ensure high-level participation from institutes in the USA and EU, and also from across Asia.

Workshop Goals and Impact:

- ✓ Develop approaches for the reliable extraction of hadron ground-state form factors, parton distributions, and nucleon-resonance electroexcitation amplitudes from JLab experimental data already available and foreseen in the 12-GeV era;
- ✓ Discuss the potential for enlarging the JLab-12 experimental program in order to broaden the perceived connection between hadron structure studies using electromagnetic probes and the challenge of elucidating the (possibly related) mechanisms underlying mass generation and gluon-quark confinement;
- ✓ Initiate development of a coherent framework that enables connections to be drawn between data (elastic and transition form factors, and parton distributions) and QCD theory;
- ✓ Define the hadron-structure and interaction questions that can reliably be addressed using modern quark models;
- ✓ Capitalize and expand upon the capacity of continuum approaches to the QCD bound-state problem to provide both connections between experiment and strong-QCD phenomena and insights into emergent features of the Standard Model;
- ✓ Elucidate the potential of lattice-regularized QCD to provide insights into hadron mass generation and gluon-quark confinement and address challenges faced in the description of excited states.

Jefferson Lab
Thomas Jefferson National Accelerator Facility
Exploring the Nature of Matter

August 8, 2017

JSA Initiatives Fund Program FY2018

Re: Support for the JLab workshop on **"The Nature of Hadron Mass and Quark-Gluon Confinement from JLab Experiments in the 12 GeV Era"**, proposed by D. Carman et al., aims to draw international experts together with focus on the study of two phenomena in QCD, the nature of the hadron mass generation, and the confinement of colored quarks and gluons. Both phenomena are at the base of the stability of nucleons, the fundamental building blocks of the visible part of the universe. They also are key components of the science program of the 12 GeV energy upgrade of the JLab electron accelerator. The initiative that will pull together several dozens of international experiments from across the globe is very timely as the full science program at JLab is about to be launched in strength, and expert support in addressing these fundamental questions of the strong interaction should be the likely outcome of this initiative.

The international character of this proposal is essential as much of the expertise in this domain of strong QCD, both in theory as well as in experiment, is located outside of the US.

As head of the Hall B department that operates the CLAS12 detector system, and which will play a leading role in the experimental aspects covered by this initiative, I very strongly and without hesitation support this important initiative and its application to be funded from the FY2018 JSA initiatives Fund.

Please don't hesitate to contact me should there be any remaining questions in this matter.

Sincerely,

Volker Burkert

Volker D. Burkert
Principal Staff Scientist
Hall B Department Head
Tel: (757) 269 7440
e-mail: burkert@jlab.org

Jefferson Lab
Thomas Jefferson National Accelerator Facility
Exploring the Nature of Matter

August 9, 2017

Dear Colleagues:

I am writing this letter to express my support for the proposal to the JSA Initiative Funds Program for the workshop "*The Nature of Hadron Mass and Quark-Gluon Confinement from JLab Experiments in the 12-GeV Era*", planned for late May or early June at JLab. The workshop is a key initiative which will serve to support and promote a new generation of experiment and theory, and a collaboration between them, that will significantly expand and vitalize the JLab 12 GeV science program. There is little more important within the realm of Standard Model physics than revealing the origin of mass and mass-scales. Success in this will transform our understanding of Nature and open new paths in the search for physics beyond the Standard Model.

The Organizing Committee is constituted of respected experimentalists and theorists, and represents a diverse array of expertise and interests to guarantee that the relevant themes are explored in wide ranging debates.

For all of the above reasons, I am confident the meeting will achieve its goals. I am therefore pleased to lend my full support to this proposal.

Sincerely,

Cynthia Keppel, PhD
Hall A and C Experimental Group Leader
Thomas Jefferson National Accelerator Facility

Jefferson Lab
Thomas Jefferson National Accelerator Facility
Exploring the Nature of Matter

Dr. Jianwei Qiu
Associate Director for Theoretical and Computational Physics, and Theory Center Director

August 8, 2017

FY2018 JSA Initiatives Fund Program

Re: Support for the workshop on "Nature of Hadron Mass and Quark-Gluon Confinement from the JLab Experiments in 12 GeV Era"

The workshop titled "Nature of Hadron Mass and Quark-Gluon Confinement from the JLab Experiments in 12 GeV Era", proposed by D.S. Carman (JLab) *et al.* with Dr. Victor I Mokeev as the PI, aims to develop plans to have better communications and collaborations between theorists and experimentalists, and to take the advantage of the precise data from JLab12 to have more focused efforts on addressing two fundamental questions in the strong interaction: the origin of hadron mass and the color confinement of quarks and gluons, which are the key goals of the JLab12 upgraded program.

JLab 12GeV upgrade program is in its final phase of completion with new and precise data on its way. This workshop is necessary and timely for gathering international supports and collaborations to get ready in both ideas and analysis tools to extract the best physics results from JLab 12 GeV era. The organization of this workshop is unique in the sense it involves not only leading experts in the field, both in theory and experiment, but also those from outside of the United States. It will be a true international workshop, which will be critically important for the success of the JLab12 program, especially, at this early stage of the program.

As an Associate Director for Theoretical and Computational Physics at JLab, and the Director of its Theory Center, I value the importance of this workshop and have been encouraging my theory colleagues to get involved, and I would like to offer my full and unconditional support to this proposal and its application for the FY2018 JSA Initiatives Fund to support the workshop.

Please feel free to contact me should you need more information or have any questions.

Sincerely yours,

Jianwei Qiu

Digitally signed by Jianwei Qiu
DN: cn=Jianwei Qiu, o, ou, email=jqiu@bnl.gov, c=US
Date: 2017.08.11 08:03:16 -05'00'

Jianwei Qiu
Email: jqiu@jlab.org

Department of Physics
College of Natural Sciences
Kyungpook National University
Daehak-ro 80, Buk-gu, Daegu 41566, KOREA

August 10, 2017

Yongseok Oh, Ph.D
Associate Professor
Department of Physics
Kyungpook National University
Daegu 41566, South Korea
Email: yohphy@knu.ac.kr

FY2018 JSA Initiative Fund Program

Re: Support for the workshop on "The Nature of Hadron Mass and Quark-Gluon Confinement from the JLab Experiments in 12 GeV Era" proposed by D.S. Carman (JLab) *et al.* with Dr. Victor I. Mokeev (JLab) as the PI.

I am writing this letter to express my support for the proposal to (FY2018) JSA Initiative Fund Program for the workshop, "The Nature of Hadron Mass and Quark-Gluon Confinement from the JLab Experiments in 12 GeV Era" to be held in the Asia Pacific Center for Theoretical Physics (APCTP, https://apctp.org) which locates in Pohang, Korea, in late May or early June, 2018. This workshop will provide a good opportunity to discuss JLab physics programs with the experts in the Asia-Pacific region, which will be beneficial to both sides. On behalf of the Korean local organizers and as an academic coordinator of APCTP, I confirm that Korean local organizers are committed to provide $5,000 in matching funds to support a proposed workshop. We will also continue to seek additional funds to provide extra support for the success of the proposed workshop.

This workshop will initiate strong collaborations among the experts in the US, Europe, and the Asia-Pacific region. We will do our best for the success of the proposed workshop. Please feel free to contact me if you have any questions.

Sincerely yours,

Yongseok Oh, Ph.D
Associate Professor
Kyungpook National University, Korea