GHP Newsletter December 2017

American Physical Society Topical Group on Hadronic Physics

http://www.aps.org/units/ghp/

Executive Officers

Join GHP by following a link on the lower-right of our web page; namely, from: http://www.aps.org/units/ghp/.

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1 Elections

Elections for two posts in the GHP Executive (Vice-Chair and Member-at-Large) closed on 1 December 2017. Of the eligible GHP members, $\sim 40\%$ voted.

The incoming Executive Committee, as of 1 January 2018 includes the new officers: Garth Huber, University of Regina (Vice-Chair) and Anne Sickles, University of Illinois Champaign-Urbana (Member-at-Large). They will be listed as officers on the masthead of the next newsletter.

We thank our outgoing Executive members Raju Venugopalan (Past Chair) and Ian Clöet (Member at Large) for their stellar service and dedication to hadronic physics past, present and future.

Our rules state that: *the Committee shall nominate at least two candidates for the offices of Vice-Chair and for the open position of Member-at-Large; the slate of candidates will be balanced as much as possible to ensure wide representation amongst the various fields of physics included in the GHP's membership; the Nominating Committee shall be chaired by the immediate Past Chair and shall include four members in addition to its Chair, one of whom shall be appointed by the APS.*

This year's Nominating Committee was:

Nominating Committee
Raju Venugopalan (*Chair*)
raju@bnl.gov

Evangeline Downie	David Armstrong	Huey-Wen Lin	Cynthia Keppel
edownie@gwu.edu	armd@jlab.org	hwlin@pa.msu.edu	keppel@jlab.org

The Chair of the Nominating Committee in 2018 will be
Paul Reimer (reimer@anl.gov)

We suggest that GHP members now begin considering whom they would like to see filling the three open positions in 2018 (Vice Chair, Member at Large and Secretary-Treasurer) and encourage members with ideas to contact the *Chair of the Nominating Committee* and pass on their suggestions. There is strength in diversity and so the Executive would like to see nominations from across the entire spectrum of GHP's membership.

Attracting and serving a diverse and inclusive membership worldwide is a primary goal for APS. In calling for nominations, we wish to remind you how important it is to give full consideration to qualified women, members of underrepresented minority groups, and scientists from outside the United States.

We also urge GHP members to remember to vote when the election is announced. Every vote counts since sometimes winners are decided by a handful of votes. The energy of the Executive Committee in working for the membership is dependent upon nominating and electing qualified, dedicated and active members of the Executive.

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2 Fellowship

We would also like to remind the GHP that each year the APS allocates a number of Fellowship Nominations to a Topical Group. That number is based primarily on membership. Since we are in the neighborhood of 470 members, we are allocated TWO regular nominations. We also note that to remain at the level of two regular fellows, we need to maintain and, preferably, increase our membership. Thus please consider advocating joining GHP to your colleagues and students.

The instructions for nomination may be found at
http://www.aps.org/programs/honors/fellowships/nominations.cfm
The entire process is now fully online.

A few things to know before proceeding, however. One must

- Ensure the nominee is a member of the Society in good standing as well as a member of GHP. The online site will do this for you but it's best to check beforehand, to save yourself time or get your nominee to join APS and GHP.
- A nomination requires a sponsor and a co-sponsor. During the online nomination process, you will be required to provide details for a co-sponsor. After you complete a nomination, the co-sponsor will be notified by EMail. It would be best to coordinate with the co-sponsor beforehand.
- In addition to the nomination letters, you will require supporting letters, that will need to be uploaded to the APS web site. Two letters of support are sufficient. Individuals providing letters of support do not have to be members of the APS, however the sponsor should be an APS member. Note that to nominate someone for Fellowship, the sponsor does not need to be a Fellow themselves.
- The nomination process should be complete prior to GHP's deadline:

Monday 1st June 2018

The APS will subsequently forward the nominations to the GHP Fellowship Committee, chaired by the incoming GHP Vice-Chair Garth Huber.

The Executive urges members of GHP to nominate colleagues who have made advances in knowledge through original research and publication or made significant and innovative contributions in the application of physics to science and technology. They may also have made significant contributions to the teaching of physics or service and participation in the activities of the Society.

It is also relevant and timely to remind GHP members not only of the importance of nominating our talented colleagues for fellowships in the GHP but also that there is considerable work entailed in preparing the nomination. Thus it is important to ensure that

the nomination package is completed ahead of the APS deadlines. If we do not have enough nomination packages to recommend two Fellows to APS, we cannot adequately serve our membership in this regard.

Figure 1: Kawtar Hafidi

This year, the GHP Elected one Fellow, Kawtar Hafidi of Argonne National Laboratory. Her citation reads: For leadership of experimental programs using the nucleus to probe the nature of QCD at HERMES, the Thomas Jefferson National Accelerator Facility, and the Electron Ion Collider, exceptional service to the field of hadronic physics, and remarkable and widely-recognized mentoring and outreach activities.

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3 Dissertation Award

The GHP Dissertation Award was established in February 2012, thanks to significant contributions from Brookhaven Science Associates (the management contractor for the Brookhaven National Laboratory), Jefferson Science Associates, LLC (the management contractor for Jefferson Lab), Universities Research Association (the management contractor for Fermi National Accelerator Lab) and personal contributions from some of our members.

The Award is a prize of $ 1000 and a travel allowance of up to $ 1500; and the winner is invited to deliver a plenary presentation at the Biennial GHP Meeting, the next of which will take place in 2019.

At this time the GHP Executive would like to urge GHP's members to begin thinking about suitable candidates for the Third GHP Dissertation Award, nominations for which will close on

Tuesday 9 October, 2018

The nominations should be sent to Tanja Horn, who will be GHP Chair at that time. In the interim, Tanja will invite four other GHP members to join her five-member Dissertation Award Committee.

The submissions are judged according to the following criteria: quality of the written dissertation (40%), contribution of the student to the research (30%), impact of the work (15%), and broader involvement of the student in the community (15%).

The current endowment enables GHP to present the Dissertation Award biennially. In order to maintain that endowment and, perhaps, to expand the Award, the Executive encourages our members to

Donate to the award fund.

For information on how to donate, please see:

https://www.aps.org/memb-sec/profile/DonationFunds.cfm

It would be ideal if we could increase the endowment so that sufficient funds were available to present this award in every year and thereby honor more of the bright young scientists entering Hadron Physics.

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4 GHP Program at the APS April Meeting 2018

14-17 April 2018, Columbus, OH
http://www.aps.org/meetings/april/

GHP participates in the annual APS April Meeting, which is also the primary meeting of the unit in even years, such as in 2018. Roughly 100 of our members attend the APS April meeting each year.

GHP is allocated two invited sessions at the April meetings. We often organize joint sessions with other units, in order to raise our profile by increasing the number of sessions sponsored by the GHP. (The maximum currently possible is four by this counting.)

The program committee for the 2018 APS April meeting is

Program Committee

Tanja Horn (*Chair*)
hornt@jlab.org

Kai-Thomas Brinkmann kai-thomas.brinkmann@exp2.physik.uni-giessen.de	Michael Engelhardt engel@physics.nmsu.edu
Renee Fatemi rfatemi@pa.uky.edu	Susan Gardner svg@pa.uky.edu

The Abstract Submission Deadline is:

January 12, 2018 at 17:00 EST

We would like to remind our members planning to attend the April Meeting of the GHP Sorting Categories. These can be found by going to the abstract submission page and clicking on category E. Hadronic Physics. The drop down menu shows the GHP categories:

- E1. Light Mesons and Baryons
- E2. Heavy Flavor Hadrons
- E3. Nucleon structure and nucleon spin

- E4. QCD Effects in Medium

Please keep these categories in mind when submitting abstracts.

In addition, since there is no GHP Meeting in association with the 2018 April Meeting, we will hold our Business meeting at the April Meeting. Any members attending the April Meeting are invited to attend. Details of the full GHP Program at the April Meeting will be provided in the next newsletter, ahead of the April Meeting.

5 Update on Open Access

We have been following the move toward open access and what it means for the APS in previous newsletters https://www.aps.org/units/ghp/newsletters/, in particular those of March 2016 and April 2017. As was noted in the June 2017 edition of APS News https://www.aps.org/publications/apsnews/201706/index.cfm, APS has signed an agreement with CERN to publish high energy physics papers open access with SCOAP^3. Further details are now available and will appear in the December 2017 issue of APS news. The APS News article is reproduced, with permission, in its entirety below. Authors who publish under a qualifying primary arXiv category may continue to cross list under the secondary nuclear physics arXiv categories: nucl-ex and nucl-th. For more details about SCOAP^3, see their website.

5.1 What You Need to Know: APS and SCOAP^3

Following extensive discussions and a vote by the APS Board of Directors at its meeting in April, APS recently signed an agreement with CERN, which represents the Sponsoring Consortium for Open Access Publishing in Particle Physics (SCOAP^3 http://scoap3.org), to publish high-energy physics (HEP) papers open access. APS leadership took this step in support of the high-energy physics community to offer researchers a convenient route to publish their HEP work open access in Physical Review journals. Starting January 1, 2018, HEP papers published in Physical Review Letters http://journals.aps.org/prl/, Physical Review C http://journals.aps.org/prc/, and Physical Review D http://journals.aps.org/prd/ will be open access, paid for centrally by SCOAP^3. Library subscriptions will be modified accordingly. This arrangement will initially last for two years, up to the end of 2019.

Authors: Authors of HEP papers submitted to these journals will notice very little change in procedures.

- HEP papers covered by SCOAP^3 are all those posted on arXiv.org https://arxiv.org prior to publication in any of the primary 'hep categories: hep-ex, hep-lat, hep-ph, hep-th, and irrespective of the authors institution or country affiliation.
- HEP papers published in the three participating APS journals on or after January 1, 2018, will be open access, even if the manuscript was originally submitted prior to this date.
- Papers published under the agreement will be marked as supported by SCOAP^3 and will be covered by a Creative Commons CC-BY license http://creativecommons.org/licenses/?lang=en. Authors will not be required to

pay the open access Article Processing Charges (APC) for their articles as these will be covered centrally by SCOAP^3.

Librarians: Because APS HEP articles will be open access, paid for by SCOAP^3, all customer libraries will receive a commensurate reduction in subscription fees to offset this arrangement.

- The amount of the reduction will be clearly shown on the renewal notice received by customers, along with the full subscription price and the final amount payable incorporating the SCOAP^3 offset. The reduction reflects, and offsets, the proportion of the HEP open access content of their subscription already covered by payments made by SCOAP^3 to APS. Libraries already participating in SCOAP^3 will receive an immediate reduction. Libraries not yet contributing to SCOAP^3 will receive a credit note in 2018 against their 2019 subscription charge.
- SCOAP^3 is primarily financed by direct voluntary contributions of these reductions by over 3,000 libraries in 43 countries. More information about how to support the initiative is available at SCOAP^3.org.
- The offset reduction has been meticulously calculated to ensure that APS does not double-dip on papers published open access under SCOAP^3. APS will receive no additional revenue for the HEP papers, apart from that received via SCOAP^3.

Readers: The biggest and most obvious change is that HEP papers published in APS journals will be available to anyone to read without any charge, through the appropriate Physical Review journal website.

- Papers published under SCOAP^3 will carry the Creative Commons CC-BY license, which is the most permissive available. Others may distribute, reuse, remix, or build upon the published work, properly attributed to the authors.

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6 APS Advocacy in 2017: working together to be a voice for physics

Communicated by Tawanda Johnson (tjohnson@aps.org)) and Gregory Mack (mack@aps.org)

In 2017 the APS Office of Government Affairs (APS OGA) assisted Society members to make more than 13,000 contacts phone calls, emails, and meetings – with their congressional representatives on crucial science policy issues. This included targeted approaches in specific states and districts, online campaigns for individual APS units, and activities at APS meetings. That overwhelming response from APS members led directly to action by the House and Senate.

The approach for the year began with a conversation at the APS Leadership Convocation. APS OGA met with Unit representatives during the event to develop a common strategy to address the anticipated Trump Administration proposed cuts to fiscal year 2018 federal budget.

"We discussed a strategy for direct lobbying and grassroots advocacy on the federal science budget, as well as the need to build more champions for science in Congress", said Francis Slakey, APS Director of Government Affairs. Many of the Units also agreed to partner with OGA on Unit-specific strategically-timed grassroots advocacy campaigns throughout the year.

6.1 Integrated Advocacy & State-Based Campaigns

The discussion with Unit leaders kicked off OGAs new Integrated Advocacy Strategy. The strategy has four steps:

- OGA identifies a target senator or representative and a specific advocacy goal.
- OGA reaches out to find a constituent volunteer in the target location and the OGA Press Secretary, Tawanda W. Johnson, works with volunteer on an op-ed for the local newspaper or national publication.
- Once the op-ed is published, APS government relations specialist Greg Mack works with APS Communications to send an alert to all the APS members in the state or district urging contact with the targeted member of congress, in order to amplify the message of the op-ed.
- Mack then sets up in-state meetings for the author with the local office of the targeted senator or representative, and the OGA staff amplify the message through meetings with the DC staff of the congressional office.

This holistic approach to advocacy focuses on local impact and local voices, supplemented by DC-based lobbying by OGA.

Op-ed article authors this year included Jessica Winter (OH), Mina Hanna (TX), Karen King (MO), Dominic Calabrese (CA), Olle Heinonen (MN), Timothy Gay (NE), Maury Tigner (NY), and Patrick LeClair (AL). Each stressed a key message including the importance of federal investment in science, federal support for the nations science infrastructure, and the critical value of STEM education. Most of these articles are archived on the APS OGA web page.

All of these authors met with the local congressional offices, often with welcome results. For example, in the case of Jessica Winter, Senator Portmans staff in Ohio chose to go to the campus of The Ohio State University to meet with her and her colleague Chris Hammel, and tour the physics department.

In most cases, the combination of the op-ed, grassroots advocacy, and local meeting generated favorable and demonstrable support for science by the targeted member of congress.

6.2 Nationwide Advocacy Campaigns

The OGA ran 15 nationwide unit-specific advocacy campaigns in 2017, which included activities at several APS meetings. OGA staff worked with Unit executive committees to craft the messaging and with APS Communications to send emails to Unit members.

Campaigns for the Division of Nuclear Physics (DNP) and Division of Particles and Fields (DPF), which involved members of the Group on Hadronic Physics, urged support for federal science funding, with examples of nuclear science and high energy physics. The Forum on Education (FEd) addressed science education funding, specifically for teacher preparation and informal programs, amplifying Karen Kings op-ed.

The Forum on Physics and Society (FPS) advocated for Congress to increase the current caps on the federal budget. OGA also worked outside of APS to partner with the Society of Physics

Students to stress the importance of federal funding that enables undergraduate research, such as Research Experience for Undergraduates programs. The Forum on Graduate Student Affairs (FGSA) advocated to reject a proposal in the House "Tax Cuts and Jobs Act" that would tax graduate students tuition waivers.

The various campaigns often had high-levels of APS member participation and produced clear results. For example, OGA worked with FGSA to encourage the Senate to reject the House proposed tax on tuition waivers. Within 24 hours students made more than 1,200 contacts, reaching 21 of the 26 members of the Senate Finance committee and the Senate did not include it in its version of the bill.

"Our work with APS Units was an extremely effective form of advocacy through 2017", said Mack. "Weve established an effective partnership, added Slakey, that well build on in 2018". OGA looks forward to continuing to work with APS Units in the coming year to enable APS members to be strong advocates for the needs of the physics community.

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7 Meeting Summaries

NB. We would be pleased to receive summaries from GHP membership of meetings that they have organized or attended. Please send the summaries to the GHP Secretary-Treasurer, Ramona Vogt (rlvogt@lbl.gov). We thank the members who have contributed summaries in this newsletter.

7.1 VIth International Workshop on Nonperturbative Aspects of Quantum Field Theories

Communicated by Adnan Bashir (adnan@ifm.umich.mx)

The VIth International Workshop on Non Perturbative Aspects of Quantum Field Theories was held 24-28 April 2017, at the Mesoamerican Centre for Theoretical Physics, (MCTP), situated at The National University of Chiapas, Tuxtla Gutirrez, Chiapas, Mexico: http://mctp.mx/index.html. All previous workshops in this series have been organized in the colonial city of Morelia in the state of Michoacn, but on this occasion the organizers wished to highlight the location and role of the MCTP in Mesoamerica: MCTP is one of the four partner institutes of the Abdus Salam - International Centre for Theoretical Physics, Trieste, Italy. MCTP hosted and funded this event through a CONACyT grant (CONACyT is Mexico's National Council for Science and Technology.)

The primary theme was QCD and hadron physics, with sub-themes being the nature and impact of confinement and dynamical chiral symmetry breaking, the use of continuum methods for solving strong QCD, and related issues in the physics of heavy quarks. The participants were drawn from Brazil, China, France, Spain, the United Kingdom, the United States of America and, of course, Mexico, and included a good number of early-career researchers. Prolonged informative discussions were organized in the tradition of a true workshop.

The basic idea of the meeting was to gather experimentalists and theorists who are working together to unravel the internal structure of hadrons. At the level of quarks and gluons, presentations described our steadily improving understanding of their low-order n-point Schwinger functions and the effective use of symmetries to inform and constrain the properties

of those functions. Progress in the calculation of hadron elastic and transition form factors was reported by several speakers in direct connection with experiments at Babar, Belle, and JLab. Experimentalists, who are playing a key role in the worldwide efforts to measure such form factors, delivered updates on the current status and future plans so as to provide a sound grounding and guide for the theory efforts. There were theory reports on the calculational status of parton distributions functions and their generalized version within a pion and a nucleon. The extension of QCD bound state calculus to off-shell pions and kaons was also discussed, canvassing issues which could prove useful in the planning and analysis of a wide range of experiments, including elastic form factors, distribution functions, and calculations of the hadronic contribution to $g-2$ for the muon.

This intense week of "brainstorming" produced many fresh ideas and spawned a number of new and promising collaborations. It was therefore of particular value to the somewhat isolated but active hadro-particle physics community in Mexico.

7.2 QCD Evolution 17

Communicated by Leonard Gamberg lpg10@psu.edu

The QCD Evolution 2017 workshop was held at Thomas Jefferson National Lab from 22-26 May 2017. It is a continuation of a series of workshops held during six consecutive years, in 2011, 2012, 2013, 2015 at Jefferson Lab, and in 2014 in Santa Fe, NM, and in 2016 at the National Institute for Subatomic Physics (Nikhef) in Amsterdam. The workshop series has focused on the rapid developments in our understanding of the evolution of parton distributions including TMDs, GPDs, low-x, higher-twist correlation functions, and the associated progress in perturbative QCD, lattice QCD and effective field theory techniques such as soft collinear effective field theory (SCET). The 2017 workshop was organized by Jefferson lab with additional support from Brookhaven National Lab, Los Alamos National Lab, Pennsylvania State University-Berks, and Old Dominion University.

The organizing committee was co-chaired by Jianwei Qiu (JLab) and Alexei Prokudin (JLab and Penn State Berks), along with Harut Avakian (JLab), Ian Balitsky (JLab and ODU), Bipasha Chakraborty (JLab), Leonard Gamberg (Penn State Berks), Zhongbo Kang (UCLA), Anatoly Radyushkin (JLab and ODU), Nobuo Sato (JLab and UConn), Andrea Signori (JLab), and Ivan Vitev (LANL).

This year's workshop attracted 65 registered participants. All young scientists were provided with financial support to defray costs for travel and/or lodging, and the conference registration fee. The program consisted of 60 invited plenary talks over 18 sessions during the five-day period.

The program of the workshop paid special attention to the topics of importance for ongoing experiments, in the full range from Jefferson Lab energies to RHIC and LHC energies or future experiments such as a future Electron Ion Collider, recently recommended as a highest priority in the U. S. Department of Energy 2015 Long Range Plan for Nuclear Science.

A description of all aspects of the workshop, including the scientific program, can be found on the workshop web page, https://www.jlab.org/conferences/qcd-evolution2017/.

Some of the highlighted talks organized by topic were pQCD: "On Perturbative QCD from the LHC to the EIC, Frank Petriello (Northrwestern Univ. and Argonne), "Next to Leading Order SIDIS at large transverse momentum, and Bowen Wang (JLab and ODU); LATTICE QCD: "Precise QCD from the Lattice Peter Lepage (Cornell Univ.), "Hadron structure from lattice

QCD, Kostos Orginos (William and Mary and JLab), "Renormalization Issues of quasi-PDFs, Martha Constantinou (Temple Univ.), and "Excited States and Precision Calculations of Hadron Structure, David Richards (JLab); LOW-x PHYSICS: "Unifying the TMD operator structure for gluons at small-x, Piet Mulders (Nikhef and Free Univ. Amsterdam), "Gluon Helicity Distribution at Small-x, Yuri Kovchegov (Ohio State Univ.), and "Small-x Evolution of Quark Helicity, Matt Sievert (LANL); EXPERIMENTAL NUCLEON STRUCTURE: "TMD effects in SIDIS at COMPASS, Andrea Bressan (Univ. of Trieste and INFN), "Physics Opportunities for JLab 12 GeV, Bob McKeown (JLab), and "Measurements of fragmentation functions and implications for SIDIS, Gunar Schnell (Univ. of the Basque Country); JET AND HEAVY ION PHYSICS: "Recent Developments in Jets and Heavy Flavor Physics, Ivan Vitev (LANL), "The transverse momentum dependent hadron distribution within jets, Felix Ringer (LBNL), and "What does the 3-D structure of the proton teach us about matter created in heavy-ion collisions?, Raju Venugopalan (BNL); HEAVY QUARKS: "Heavy Quarkonia Production at Threshold from JLab to EIC, Zein-Eddine Meziani (Temple Univ.), "TMD studies using quarkonia, Jean-Philippe Lansberg (IPN-Orsay Paris-Sud), and "Nuclear gluons with heavy quark probes at EIC, Christian Weiss (JLab); TMDS PDFS GPS AND ALL THAT: "What do we know and don't know about parton distributions?, Wally Melnitchouk (JLab), "Connecting different TMD factorization formalisms in QCD, Ted Rogers (ODU and JLab), "Quasi-PDFs and pseudo-PDFs, Anatoly Radyushkin (ODU and JLab), "Connections between TMDs and collinear twist-3 functions within the context of single-spin asymmetries, Daniel Pitonyak (Penn State Univ. Berks), "Jet correlators and transversity in inclusive DIS, Alberto Accardi (Hampton Univ. and JLAB) "TMDs of a Spin-1 Target, Ian Cloet (Argonne), and "Twist Three GPDs, Matthias Burkardt (New Mexico State Univ.).

A description of all aspects of the workshop, including the scientific program, can be found on the workshop web page https://www.jlab.org/conferences/qcd evolution2017/program.html

The written versions of talks presented will be available in the Proceedings of Science (PoS): https://pos.sissa.it/cgi-bin/reader/conf.cgi?confid=308.

7.3 NSTAR2017

Communicated by Ralf Gothe (gothe@sc.edu) and Viktor Mokeev (mokeev@jlab.org)

More than one hundred nuclear and particle physicists from 62 different institutions all around the world participated in the NSTAR2017 conference, presenting and discussing their latest results. This 11$^{\text{th}}$ International Workshop on the Physics of Excited Nucleons took place at the University of South Carolina, Columbia, SC, USA, 20-23 August 2017. The aim of the conference was to develop and push our understanding of strong QCD as it confines quarks and creates nucleons and their excitations from these fundamental building blocks. Hence, the topics focused on: the baryon spectrum through meson photoproduction; baryon resonances in experiments with hadron beams and in e^+e^- collisions; baryon resonances in ion collisions and their role in cosmology; baryon structure through meson electroproduction, transition form factors, and time-like form factors; amplitude analyses and baryon parameter extraction; the baryon spectrum and structure from first principles of QCD; advances in modeling the baryon spectrum and structure; and future facilities and projects. The detailed program and all presentations can be found at the workshop website: http://nstar2017.physics.sc.edu/. The public lecture, "Laying the God Particle to Rest", by Craig Roberts from Argonne National Laboratory addressed the corresponding topic of how mass is generated in our world. Organizing the NSTAR workshop around the total solar eclipse was a bigger challenge than anticipated four years ago under the direction of Ralf Gothe (USC) when the idea was born.

However, in the end, it was a special highlight that touched everyone who could experience it in a very profound manner.

Studies of the spectrum of excited nucleons (N^*) and their structure offer unique opportunities to explore many facets of strong QCD dynamics in the generation of various excited nucleons with different quantum numbers and distinctively different structures. Another important part of these efforts is focused on the search for new states of baryon matter expected in approaches with traceable connections to the underlying QCD, but still elusive for experimental detection, the so-called missing resonances and hybrid-baryons with glue as the active structural component. For these reasons, the nucleon resonance studies represent a particularly important avenue in the exploration of strong interaction dynamics in the regime of large quark-gluon running couplings. Fostering the synergistic efforts between experimentalists, phenomenologists and theorists to explore the excited nucleon spectrum and structure and to eventually unravel their emergence from QCD was one of the major workshop objective. The current status of the N^* spectrum and structure studies from experiments with electromagnetic probes, as well as the future prospects in this field, in particular in the new era of experiments with the CLAS12 detector at the upgraded Jefferson Lab were reviewed in the experimental keynote talk by V. Burkert (JLab). The key role of nucleon resonance studies for understanding the strong QCD dynamics that generates the ground and excited nucleon states, as well as the key open problems in the Standard Model on the mechanisms of hadron mass generation and the nature of quark-gluon confinement were presented in the theoretical keynote talk by C. D. Roberts (ANL). The review of the future developments in hadron physics, presented in the final opening talk by B. McKeown (JLab), elucidated the opportunities for N^* physics to contribute to the broad research efforts in contemporary hadron physics.

The experimental studies of exclusive meson photoproduction off the nucleon at the CLAS, ELSA, and MAMI facilities continue to show rapid progress. These experiments provided detailed information on all exclusive meson photoproduction channels relevant in the resonance region, including differential cross sections and single-, double-, and triple-polarization asymmetries. The most recent advances in experimental studies of exclusive meson photoproduction off protons were presented in talks by V. Crede (FSU), E. Pasyuk (JLab), H. Schmieden (Bonn), V. Sokhoyan (MAMI), and S. Strauch (USC). The data on exclusive photoproduction off bound neutrons keeps growing. These efforts were presented in the talks by A. Sandorfi (JLab), P. Mattione (JLab), and I. Strakovsky (GWU) and in several talks in parallel sessions. The wealth of the available experimental results opens up new opportunities to determine the pseudo-scalar meson photoproduction amplitudes from the measured observables under minimal model assumptions. New methods to extract reaction amplitudes and resonance parameter from experimental data were presented by A. Svarc (Zargeb). Because of the limited accuracy of the experimental data, constraints imposed by the general reaction amplitude properties such as unitarity and analyticity are particularly important for evaluating the resonance parameters, even when they can be determined in a nearly model independent way. The development of methods allowing us to build the reaction amplitudes under the aforementioned constraints were discussed by V. Mathieu (JLab) and J. Nys (Ghent). Recent developments in reaction models that account for constraints imposed by unitarity, analyticity, and chiral symmetry capable of treating the triangule singularities were presented by E. Oset (Valencia) elucidating insights into the resonance nature they are providing.

So far, the multi-channel approach employing a coupled-channel scheme represents the most advanced approach of the reaction models developed to extract resonance parameters from

combined global analyses of all available data on exclusive meson photo- and hadroproduction. Recent advances in the development and application of the coupled-channel approaches to analyze exclusive meson photoproduction data were presented by M. Doering (GWU), M. Mai (GWU), and S. Nakamura (Cruzeiro do Sul). Such analyses of exclusive meson photoproduction data within the coupled channel approaches considerably extend our knowledge of the N^* spectrum. V. Burkert (JLab) emphasized this important achievement in the opening talk. In particular, the Bonn-Gatchina coupled-channel analysis revealed several N^* candidate states that have been included in the 2014 edition of the PDG as an outcome of these efforts. The next important step should be the extension of the coupled-channel approaches for the studies of exclusive electroproduction data with a kinematic coverage over the full, or at least the largest, part of the resonance excitation region. The manifestation of new candidate-states in exclusive electroproduction with Q^2-independent masses and total and partial hadronic decay widths will validate the existence of new baryon states in a nearly model-independent way, allowing us to complete the long-term effort on the search for the "missing-baryon states. The extension of the coupled-channel approaches to exclusive electroproduction is also of key importance for the hybrid-baryon search in the upcoming experiments with the CLAS12 detector at Jefferson Lab. These states were predicted in recent lattice QCD studies of the hadron spectrum and independently supported by various quark models, but have not yet been observed. The unique combination of the 11 GeV continuous electron beam and the CLAS12 detector with an almost 4π acceptance will allow us to search for these states in exclusive $\pi^+\pi^- p$, $K\Lambda$, and $K\Sigma$ electroproduction channels, scanning, for the first time, the mass range from 1.8 to 3.0 GeV, where the lightest hybrid-baryons should be located, according to theory expectations. The characteristic Q^2-evolution of the resonance electroexcitation amplitudes will reveal the signature of the glue contributions. This research activity was reviewed in the talk by A. D'Angelo (INFN).

Results on the evolution of the N^* electroexcitation amplitudes ($\gamma_V NN^*$ electrocouplings) with respect to the photon virtuality, Q^2, obtained from the data on exclusive meson electroproduction off nucleons, offers access to the internal structure of all prominent resonances. They shed light on the strong QCD dynamics that generates the full spectrum of excited nucleon states as bound systems of quarks and gluons. The CLAS detector at JLab has produced the dominant part of the available worldwide data on all relevant meson electroproduction channels off nucleons in the resonance region for Q^2 up to 5.0 GeV^2. The experimental results from the meson electroproduction off protons were presented by D. Carman (JLab), K. Park (JLab), and P. Cole (Lamar). First results on πp electroproduction off bound neutrons were presented by Y. Tian (Syracuse). Further experimental results on $N\pi$, $\pi^+\pi^- p$, and ωp exclusive electroproduction off free protons and bound nucleons keep growing with a focus on the studies of the high mass region, $W > 1.6$ GeV, and with extended coverage over photon virtualitues up to 5.0 GeV^2. The advances in these efforts were discussed in two special sessions.

All currently available results on $\gamma_V NN^*$ electrocouplings were obtained from fits to measured meson electroproduction observables within the framework of phenomenological reaction models. The MAID approach represents one of the major tools that has successfully been used worldwide over the last decades to extract resonance parameters from exclusive $N\pi$ and $N\eta$ electroproduction. The MAID approach, legacy, and future were presented by L. Tiator (Mainz). The efforts on the extraction of the $\gamma_V NN^*$ electrocouplings from the CLAS data were reviewed by V. Mokeev (JLab). These analyses of the $N\pi$, $N\eta$ and $\pi\pi p$ exclusive electroproduction data have provided the only results available worldwide on the Q^2 evolution of resonance electrocouplings for most excited nucleon states in the mass range up to 1.8 GeV and at photon virtualities up to 5.0 GeV^2 (for $\Delta(1232)3/2^+$ up to 7.5 GeV^2 and for

$N(1535)1/2^-$ up to 7.05 GeV^2). Current results show good consistency with the results on resonance electrocouplings obtained independently from analyses of different exclusive channels with entirely different non-resonant contributions, offering sound evidence for the credible extraction of these fundamental quantities. In the near future, electrocouplings up to 5.0 GeV^2 of most excited nucleon states in mass range up to 2.0 GeV will become available from independent analyses of the CLAS data on exclusive $N\pi$ and $\pi^+\pi^-p$ electroproduction off protons. The Argonne-Osaka collaboration provided the first preliminary results on the electrocouplings of $\Delta(1232)3/2^+$ and $N(1440)1/2^+$ resonances determined from global multi-channel analysis of eight meson-baryon photo-, electro-, and hadroproduction channels within their advanced coupled-channel approach accounting for the restrictions imposed by both two- and three-body unitarity conditions. This significant achievement in resonance electrocoupling extraction was reported by H. Kamano (KEK). The corresponding coupled-channel results on extraction of the resonance parameters from exclusive meson electroproduction off bound nucleons was presented by T. Sato (Osaka) and S. Nakamura (Cruzeiro do Sul). The roadmap for the implementation of quark degrees of freedom into the reaction models for extraction of $\gamma_V NN^*$ electrocouplings at high photon virtualities, up to 12 GeV^2, as expected from CLAS12, was outlined by G. Eichmann (IST).

Physics analyses such as these have already had a profound impact on the contemporary understanding of strong QCD dynamics. The Dyson-Schwinger Equations of QCD (DSEQCD) successfully describes the data on the elastic and transition ($N \to \Delta(1232)3/2^+$ and $N \to N(1440)1/2^+$) form factors from CLAS for $Q^2 > 2.5$ GeV^2 with the same momentum-dependent dressed quark running mass, which turns out to coincide with those used to successfully describe the pion elastic form factor. These breakthrough results, reported by J. Segovia (Munich), demonstrated that constituent quarks with a momentum-dependent mass, inferred from the QCD Lagrangian within DSEQCD, represent the relevant structural component for the ground and excited nucleon states. Furthermore, this success offers strong evidence for the capability to explore the mechanisms behind the generation of more than 98% of the hadron mass, based on the experimental results on Q^2-evolution of resonance electrocouplings. This is one of the most important achievements of the synergistic efforts between experimentalists, phenomenologists, and theorists in hadron physics. Further validation in future DSEQCD analyses of experimental results on the N^* structure of various excited states is, however, still required. The evaluation of the orbital-excited $N(1535)1/2^-$ resonance electrocouplings within DSEQCD presented by A. Bashir (Michoacan) represents the first step in this direction. Consistent results on the momentum-dependent running quark mass from the data on the Q^2-evolution of different resonance electrocouplings, studied independently for all prominent excited nucleon states as well as the electromagnetic nucleon and pion elastic form factors, are critical to validate access to the mechanisms behind hadron mass generation and the emergence of quark-gluon confinement encoded in the quark mass momentum dependence. New ideas on a connection between nucleon elastic and transition form factors and the QCD process-independent effective charge were presented by J. Rodrguez-Quintero (Huelva).

So far, quark models represent the only available tool for the studies of nucleon resonance electrocouplings over the full spectrum of excited nucleon states. Moreover, they are capable of accounting for the contributions from both meson-baryon and quark degrees of freedom. New ideas on the application of the light-front holography and superconformal quantum mechanics to analyze the N^* spectrum and structure were presented by S. Brodsky (SLAC). The current status and prospects of different quark models for describing resonance structure

[0]Electrocoupling data can be found at https://userweb.jlab.org/ mokeev/resonance_electrocouplings/.

were presented by G. Ramanlo (Cruzeiro do Sul) and E. Santopinto (Genova). The evaluation of the $\gamma_V NN^*$ electrocouplings over the full spectrum of excited nucleon states at photon virtualities up to 12 GeV^2 represents a task of particular importance for theory support of future studies of the nucleon resonance structure with the CLAS12 detector. Quark models are important in providing support for the QCD-based approaches. Remarkably, strong evidence for a momentum-dependent constituent quark mass was also obtained in the analysis of the CLAS results on electrocouplings of all low-lying resonances in the mass range up to 1.6 GeV within the framework of a novel light-front quark model, as shown by V. Burkert (JLab) and in a presentation by I. Aznauryan (Yerevan).

Lattice QCD is making steady progress towards the evaluation of the nucleon resonance electrocouplings from first principles QCD and accounting for the full complexity of all strong QCD mechanisms relevant for the generation of the N^* structure. These innovative studies were discussed in two focused sessions. An overview of lattice QCD efforts in the studies of the N^* spectrum and structure was presented by J. Wu (Adelaide) and R. Briceno (JLab).

Input on strong QCD dynamics through studies of the nucleon resonance electrocouplings can be used in exploration of quark-gluon confinement from the results on the 3D-structure of the ground-state nucleons within the GPD framework. These flagship experiments with the CLAS12 detector at Jefferson Lab were presented by L. Elouadrhiri (JLab) and discussed in a parallel session. Furthermore, experimental results on resonance electrocouplings are of particular importance in the studies of quark-hadron duality as discussed in a parallel session and reviewed by W. Melnitchouk (JLab). The initiation of new joint efforts between experimentalists, phenomenologists, and theorists to study strong QCD dynamics through the exploration of the resonance spectrum and structure accessible via exclusive meson electroproduction in the resonance region and DIS-processes was one of the most important outcomes of NSTAR17 conference.

7.4 Spatial and Momentum Tomography of Hadrons and Nuclei

Communicated by Ian Cloet (icloet@anl.gov)

A 5 week Institute for Nuclear Theory (INT) program titled
"*Spatial and Momentum Tomography of Hadrons and Nuclei*" (INT173) was held between 28 August and 29 September 2017, with organizers Ian Cloët, Kawtar Hafidi, Barbara Pasquini and Zein-Eddine Meziani. This program broadly explored the emerging field of the quark and gluon tomography (or imaging) of hadrons and nuclei, with a particular focus on the Jefferson Lab 12 GeV program and a future electron-ion collider (EIC). The program began with a workshop focused on spatial tomography, and, as the weeks progressed, focus shifted to momentum tomography. The program finished with a wide-ranging workshop covering the imaging program at Jefferson Lab and a future EIC. In total the program had over 80 (external) participants, with over 90 presentations, including three "chalkboard" talks which gave a big picture introduction to the topics of the week and were aimed at a general audience.

The primary goal of the program was to identify the key experiments that need to be performed, together with the remaining theory challenges that need to be overcome, so that the tomography program at Jefferson Lab, RHIC, COMPASS and other facilities worldwide can begin to provide data that will help resolve some of the most important questions in QCD, *e.g.*, how is mass and energy distributed inside hadrons and nuclei; what are the effective degrees of freedom and their important correlations (*e.g.* dressed quarks and gluons, diquarks); how is orbital angular momentum distributed; and, ultimately, a better understanding on the origin of mass and confinement. In this regard the program was viewed

as a success. It become clear that an experimental realization of quark and gluon tomography of hadrons and nuclei, together with its theoretical understanding within QCD, will not only result in a new era for hadron physics but will also revitalize interest in our field from other branches of physics, such as condensed matter and high-energy physics.

A key outcome of the program will be a white paper that should help guide the field for the foreseeable future and address at a high level "big picture" themes of the program, such as: clear examples illustrating why imaging will be transformational to our understanding of hadron and nuclear structure; a discussion on the key questions in QCD that imaging can address; a summary of the key observables and kinematics domains of maximum interest; and an outline of what Jefferson Lab and other existing facilities can explore and what must be done at an EIC. This publication is expected to be available in the first half of 2018.

7.5 Hadron 2017

Communicated by David Richards (dgr@jlab.org)

Hadron 2017, the international conference on hadron spectroscopy and structure, took place in Salamanca, Spain from 25-29 September, following the 2015 conference in Newport News, Virginia, and attracted over 240 participants. The program comprised a series of theoretical and experimental plenary talks describing the main developments in both hadron spectroscopy and structure, together with focused parallel sessions.

A series of talks described the latest results on light-meson spectroscopy from BESIII, COMPASS and GlueX, summarized in a plenary talk by Sean Dobbs. Important results were the first paper by GlueX on beam asymmetries in $p\pi$ photoproduction as a means of understanding production mechanisms and the physics prospects in the search for multi-photon final states; Ignacio Bediaga focused on the heavy hadron decays as a theatre for light-hadron spectroscopy. Matt Shepherd described the search for light exotics, emphasising the need for theory and experiment to work in concert, and reviewed current candidates, including possible suggestions of an exotic 1^{-+} resonance in $\eta\pi$ at COMPASS.

The experimental spectroscopy of baryons containing a light quark was summarized by Ulrike Thoma. A conclusion was that the experimentally observed spectrum posed important challenges to our understanding of QCD, namely the apparent observation of parity doublets and the lack of alternating positive- and negative-parity states. Michael Doring focused on the phenomenology of the baryon spectrum, reviewing the different approaches to amplitude analysis, and emphasising the impact of new data and the inclusion of new channels to complete our description of the spectrum. Finally, the search for baryons containing heavy quarks, notably at LHCb, was described by Sebastian Neubert, including both the discovery of a doubly charmed Ξ_{cc} predicted both in lattice QCD and in numerous QCD-based models.

The theoretical description of the QCD spectrum was presented using a variety of approaches. Raul Briceno described the advances at understanding the excited meson spectrum through lattice QCD calculations, emphasising both the major first-principles theoretical developments and the numerical successes at exploiting those developments, culminating in the first determination of the scalar and tensor nonets. Christian Fischer described a Schwinger-Dyson/Bethe-Salpeter picture of QCD, focusing in particular on the understanding of "multi-quark" states.

Whilst there was a stronger emphasis on understanding the workings of QCD through studies of the spectrum and scattering than through direct probes of hadron structure, the latter was

not neglected. The emphasis here was on a three-dimensional image of the nucleon, notably through Transverse-Momentum-Dependent parton-distribution functions (TMDs), outlined by Oleg Denisov. Jianwei Qiu described the recent progress and future prospects for generating this three-dimensional and, further, five-dimensional image, emphasising the combined role of theory, experimental, analysis tools, and lattice gauge calculation. An exciting frontier in imaging of the nucleon is understanding the gluonic contributions to its structure; Thia Keppel described the opportunities presented by a future Electron-Ion Collider (EIC) for understanding both quark and gluon structure, and the development of a facility optimized to address these issues.

Finally, there were several talks focused on other manifestations of hadrons. Antonio Pineda described the recent precision extraction of the proton radius from muonic hydrogen Lamb shift, finding a value consistent with the lower value extracted from the 2S - 4P transition in atomic hydrogen. Susan Gardner focused on "precision", low-energy studies of hadrons as a theatre in which to seek physics "Beyond the Standard Model", including new sources of CP violation and so-called "dark photons".

Whilst a summary such as this concentrates on the physics content of the conference, Salamanca is a truly stunning and beautiful location, dominated by the Cathedral, with the sessions in the "Hospederia Fonseca". The meals, and in particular the conference dinner, were equally impressive, and perhaps could be summarized by saying that they ensured that the physics discussions were notably uninhibited!

A full description of the conference, including the scientific program, can be accessed at http://hadron2017.usal.es.

7.6 Heavy Flavor Production in High Energy Collisions

Communicated by Xin Dong (xdong@lbl.gov)

The workshop on Heavy Flavor Production in High Energy Collisions (https://sites.google.com/lbl.gov/hf2017) was held 30 October 1 November 2017 at Lawrence Berkeley National Laboratory (LBNL). The workshop focused on experimental and theoretical developments in heavy flavor and quakonium production in high energy electron, proton and heavy-ion collisions as well as future experimental and theoretical efforts towards understanding QCD through the utilization of heavy flavor probes. Recent results from the LHC, RHIC and other experimental programs were reported at this workshop by 60 participants from 11 countries. There were 34 scientific presentations. About 1/3 of them were by young students and postdocs.

Charm hadron results from RHIC and the LHC were one of the main focal points of the workshop. New results from the STAR heavy flavor tracker (HFT) and PHENIX vertex and forward vertex detectors (VTX/FVTX) at RHIC and the ALICE, ATLAS, CMS, and LHCb experiments at the LHC were extensively discussed at the workshop. These included precision measurements of the charm meson, D^0, nuclear modification factor R_{AA} and elliptic flow v_2, as well as the charm-strange meson D_s and charmed baryon Λ_c production in heavy-ion collisions. One conclusion from the workshop was that, in order to understand the dynamical evolution of the medium and extract its thermodynamic properties, precise measurements of the D_s and Λ_c hadrons, as well as hadrons from bottom quarks, in these collisions are needed. Bottom hadrons are a cleaner probe. However, their low production rate is an enormous challenge, especially at RHIC energies. Bottom measurements will be the focus of future detector upgrades at both RHIC (the future sPHENIX Monolithic-Active-Pixel-Sensor-based

Vertex Detector, MVTX) and the LHC (the ALICE inner traxing system, ITS, upgrade).

Another important development at the workshop was on heavy quark and quakonium production in $p+p$ and $e+p/A$ collisions. There were fruitful discussions towards the understanding of the quakonium production mechanism in elementary collisions. Participants also discussed the role of heavy quark and quarkonium probes in the upcoming JLab 12 GeV upgrade program as well as in future Electron-Ion Collider experiments.

The local organizers of the workshop were Xin Dong (LBNL), Ernst Sichtermann (LBNL), Ramona Vogt (LLNL/UC Davis) and Xin-Nian Wang (LBNL).

7.7 Quarkonium 2017: The 12$^{\text{th}}$ International Workshop on Heavy Quarkonium

Communicated by Geoff Bodwin (gtb@anl.gov) and Peter Petreczky (petreczk@bnl.gov)

More than 200 theorists and experimentalists participated in the 12th edition of the International Workshop on Heavy Quarkonium, which was held at Peking University 6-10 November 2017, see http://indico.ihep.ac.cn/event/6822/overview.

This series of workshops is sponsored by the Quarkonium Working Group (QWG). The most recent edition was sponsored locally by the Peking University School of Physics, with additional support from IHEP, Beijing. The Workshop covered topics in quarkonium spectroscopy, decays, production, properties in media, standard model measurements, and physics beyond the standard model.

Talks on quarkonium spectroscopy included new theoretical results that suggest the existence of tetraquark states. On the other hand, new lattice-QCD results do not find a stable $2b$-$2\bar{b}$ tetraquark state.

A highlight in the production sessions was the presentation of a new theoretical formulation for quarkonium production that accounts for the difference between the heavy-quark-antiquark momentum and the quarkonium momentum. There was also a discussion of a method for resummation of large logarithms in exclusive quarkonium production that overcomes the problem of divergent series in conventional approaches. One surprising new result was the discovery of an error in assumptions about the leptonic tensor in long-standing calculations of single-particle inclusive deeply inelastic scattering. A particularly striking presentation showed that a data-driven, model-independent analysis of quarkonium production data reveals simple universal features that are not apparent in current theoretical formulations. There were also presentation of new comparisons between theory and experiment for quarkonium production within a jet. These comparisons provide novel tools with which to identify the important quarkonium production mechanisms. Currently, they favor dominance of the $^1S_0$ color-octet mechanism.

In the decay sessions, impressive NNLO calculations of η_c and η_b decays to light hadrons were shown. The η_c calculations are in significant tension with existing experimental data and present a serious challenge to the current theoretical picture. An attempt to address this problem through the resummation of renormalon contributions was discussed.

Several talks have been dedicated to properties and production of quarkonium in hot medium. A common theme of these talks was the use of effective field theories. Recent progress on lattice QCD calculations in the framework on NRQCD, the effective theory for heavy quarkonium at the scale of the heavy quark mass was reported. The determination of

in-medium spectral properties from lattice NRQCD turns out to be challenging due to the Euclidean nature of the approach. More insight into the quarkonium properties at non-zero temperature could be gained from pNRQCD, which is an effective theory at scale of the heavy quark momenta inside the bound state. It is not clear a priori that pNRQCD is applicable in the temperature range of interest. To settle this issue one can compare lattice QCD results for static meson correlators with pNRQCD prediction. Such comparison was discussed, showing that pNRQCD works down to temperatures of about 300 MeV. The effective theory approach also helps to understand the mechanism of quarkonium production inside the hot medium. Recent work was also described formulates an evolution equation for the density matrix of quark anti-quark pairs in the color singlet and octet states based on pNRQCD. Under certain assumptions (strong coupling regime) these evolution equation take the Lindblad form thus making contact between EFT approach for quarkonium and the physics of open quantum systems. Quarkonium production in the context of open quantum systems was also discussed. Many new experimental data on quarkonium production from RHIC and LHC have also been presented at the meeting. Theoretical interpretation of these data in terms dynamical models in $A + A$ collisions was also discussed.

Two talks addressed quarkonium production in cold nuclear matter. The first combined the color glass condensate saturation approach at low x with the improved color evaporation model, including an adjustment in the upper limit of integration due to soft color exchanges, to improve agreement with the $\psi(2S)$ in $p + A$ data. The second proposed an automated method to evaluate the nuclear parton distribtion impact using a reweighted proceedure to reduce uncertainties, assuming dominance of this effect over all other cold matter effects at the LHC.

In the standard-model session, an important correction to the formalism for computing bottomonium hyperfine splitting on the lattice was presented. New work on the B_c spectrum at NNNLO in perturbation theory was shown, as well as a new lattice determination of α_s.

A highlight of the beyond-the-standard-model session was an analysis of heavy-stoponium-heavy-Higgs mixing. This analysis reveals a flaw in naive arguments that claim that production cross sections are enhanced when the Higgs and stoponium masses are close. In fact, mixing causes the Higgs and stoponium levels to repel each other, and so the enhancement mechanism is usually inoperative.

Despite the very full agenda, there was still time for many lively discussion during coffee breaks, over lunch, and at dinner. The abundance of new results that were presented at the Workshop reveals that, more than 40 years after the discovery of the J/ψ, the field of quarkonium physics is still a very active area of research.

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8 Forthcoming Hadron Physics Meetings

Meetings of interest to GHP's membership are listed at Mark Manley's page: http://cnr2.kent.edu/ manley/BRAGmeetings.html. In this connection, if there is a meeting you feel should be included, please send the appropriate information to John Arrington (johna@anl.gov) or Mark Manley (manley@kent.edu).

The following list is based on Mark's page:

- TRANSVERSITY 2017: 5^{th} International Workshop on Transverse Polarization Phenomena in Hard Processes (Frascati, Italy, 11-15 December 2017)

http://www.roma1.infn.it/conference/Transversity2017/

- 2018 Santa Fe Jets and Heavy Flavor Workshop (Santa Fe, NM, USA, 29-31 January 2018) http://www.cvent.com/events/2018-santa-fe-jets-and-heavy-flavor-workshop/event-summary-b6696b2bd3
- INT Workshop INT-18-70W: Multi-Hadron Systems from Lattice QCD (INT, Seattle, WA, USA, 5-9 February 2018) http://www.int.washington.edu/PROGRAMS/18-70W/
- Pion-Kion Interactions Workshop (Jefferson Lab, Newport News, VA, USA, 14-16 February 2018) https://www.jlab.org/conferences/pki2018/
- Frontiers in Nuclear and Hadronic Physics (Galileo Galilei Institute for Theoretical Physics, Florence, Italy, 26 February - 9 March 2018) https://www.ggi.infn.it/showevent.pl?id=283
- POETIC 8: 8$^{\text{th}}$ *International Conference on Physics Opportunities at an ElecTron-Ion-Collider* (Regensburg, Germany, 19-22 March 2018) https://indico.cern.ch/event/663878/
- 32$^{\text{nd}}$ Meeting of the A2/Crystal Ball Collaboration (Glasgow, Scotland, 9-11 April 2018)
- APS April Meeting (Columbus, OH, USA, 14-17 April 2018) http://www.aps.org/meetings/meeting.cfm?name=APR18
- ECT* Workshop on Exposing Novel Quark and Gluon Effects in Nuclei (ECT*, Trento, Italy, 16-20 April 2018) http://www.ectstar.eu/node/4211
- INT Program INT-18-1b: Multi-Scale Problems Using Effective Field Theories (INT, Seattle, WA, USA, 7 May - 1 June 2018) http://www.int.washington.edu/PROGRAMS/18-1b/
- ECT* Workshop on Foundational aspects of relativistic hydrodynamics (ECT*, Trento, Italy, 7-11 May 2018) http://www.ectstar.eu/node/4213
- Quark Matter 2018: *27$^{\text{th}}$ International Conference on Ultrarelativistic Nucleus-Nucleus Collisions* (Venice, Italy, 13-19 May 2018) https://qm2018.infn.it/
- Light Cone 2018 (Jefferson Lab, Newport News, VA, USA, 14-18 May 2018) https://www.jlab.org/conferences/lightcone2018/
- CHARM 2018: *The 9$^{\text{th}}$ International Workshop on Charm Physics* (Novosibirsk, Russia, 21-25 May 2018) http://charm18.inp.nsk.su/
- ECT* Workshop on Probing QCD at the High-Energy Frontier (ECT*, Trento, Italy, 21-25 May 2018) http://www.ectstar.eu/node/4213
- CIPANP18: 13$^{\text{th}}$ Confernece on the Intersections of Particle and Nuclear Physics (Indian Wells, CA, USA, 28 May - 3 June 2018)
- Real Time Computing Conference (Jefferson Lab, Newport News, VA, USA, 11-15 June, 2018) https://indico.cern.ch/event/543031
- INT Program INT-18-2a: Fundamental Physics with Electroweak Probes of Light Nuclei (INT, Seattle, WA, USA, 12 June - 13 July 2018) http://www.int.washington.edu/PROGRAMS/18-2a/

- CTEQ School on QCD and Electroweak Phenomenology (Mayaguez, Puerto Rico, USA, 18-28 June 2018) http://www.physics.smu.edu/scalise/cteq//schools/summer18/
- HYP 2018: *13th International Conference on Hypernuclear and Strange Particle Physics* (Norfolk, VA, USA, 24-29 June 2018) https://www.jlab.org/conferences/hyp2018
- ECT* Workshop on Nucleon Spin Structure at Low Q: A Hyperfine View (ECT*, Trento, Italy, 2-6 July 2018) http://www.ectstar.eu/node/4219
- FB22: *XXII International Conference on Few-Body Problems in Physics* (Caen, France, 9-13 July 2018) https://fb22-caen.sciencesconf.org/
- Lattice 2018: *36th International Symposium on Lattice Field Theory* (East Lansing, MI, USA, 22-28 July 2018) http://www.pa.msu.edu/conf/Lattice2018/
- Gordon Research Conference on Photonuclear Reactions (Holderness, NH, USA, 5-10 August 2018) http://www.grc.org/programs.aspx?id=11907
- ECT* Workshop on Mapping Parton Distribution Amplitudes and Functions (ECT*, Trento, Italy, 10-14 September 2018) http://www.ectstar.eu/node/4223
- Hard Probes 2018: *International Conference on Hard and Electromagnetic Probes of High-Energy Nuclear Collisions* (Aix-Les-Baines, Savoie, France, 1-5 October 2018) https://indico.cern.ch/event/634426/
- 5th Joint Meeting of the APS DNP and the Physical Society of Japan (Waikoloa, HI, USA, 23-27 October 2018) http://www.aps.org/meetings/meeting.cfm?name=HAW18
- QNP2018: 8th Internatioal Conference on Quarks and Nuclear Physics (Tsukuba, Japan, 13-17 November 2018) http://www-conf.kek.jp/qnp2018/

GHP members might also be interested in other conferences and workshops listed at the following sites:

- ECT* ... www.ectstar.eu
- INT ... www.int.washington.edu/PROGRAMS/programs_all.html
- JLab ... www.jlab.org/conferences

This GHP Newsletter was edited by Ramona Vogt for the Executive Committee.