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NB. EMail addressed to ghpexec@anl.gov will reach all members of the Executive.

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 GHP 2015: 6th Workshop of the GHP

8-10 April 2015

Planning is fully underway for the Sixth Workshop of the APS Topical Group on Hadron Physics. The workshop will be held in Baltimore, MD, immediately prior to and in the same venue as the April APS meeting:

April 8-10, 2015
 Hilton Baltimore
 4 West Pratt Street
 Baltimore, MD 21201

As past meetings have demonstrated, the GHP workshop offers a very good opportunity for nuclear and particle physicists to meet and discuss their common interests in hadronic interactions. So please mark these dates and the location in your calendar, and plan on attending.

All relevant information is available at the GHP 2015 Website
<http://www.jlab.org/indico/event/GHP2015>

NB. Rooms are available at a discounted rate until Friday 20 March via a link on the Workshop website.

Important reminder:

GHP2015 is a separate event from the 2015 APS April Meeting (discussed below), and has a separate registration fee. The Executive has set the scale of registration fees as follows: *Regular*: \$100 (\$120 for non-members); and *Students*: \$20 (\$40 for non-members).

The deadline for registration is

Friday 20 March 2015



Poster Session

The deadline for submission of abstracts to be considered for oral presentation is past. We received a large number of requests.

On the other hand, we would like to highlight that at GHP15 we plan to hold a 90 minute poster session on the 2nd day, preceding the Workshop Banquet. The Organisers are therefore still accepting abstracts for poster presentations and would like to encourage early-career researchers to participate actively in this way. Those who are interested in presenting a poster should send an email to ghpworkshops@gmail.com and, as soon as possible, submit their abstracts via the GHP *indico* page: <http://jlab.org/indico/event/GHP2015>.

In this connection, the Organisers reiterate that the GHP has a *limited* amount of funds that the Executive intends for use in support of the travel of some junior scientists. Interested people should contact Peter Petreczky or Craig Roberts for details. When granting support for junior researchers, preference will be given to those who present a poster.

The Executive hopes that the much-reduced registration fee for students and the opportunity to present a poster will encourage student participation in this prominent meeting of our Topical Group. We would like to urge any students who plan on attending the April APS meeting to consider coming early and participating in the GHP meeting as well.

Questions about either registration or abstract submission should be directed to Susan Schadmand at ghpworkshops@gmail.com

Workshop Banquet

A Workshop Banquet will take place after the poster session on Thursday, April 9th. It will be held at the *Rusty Scupper Restaurant*, on the waterfront promenade in Baltimore's Inner Harbor. The restaurant is located above the Inner Harbor Marina in a dramatic, free-standing building with excellent private function space. It rises three levels above the water and provides a beautiful view from every table. The cost of the dinner is \$50/person. Payments should be made during the registration process at the workshop website <http://jlab.org/indico/event/GHP2015>.

Programme:

Peter Petreczky and Raju Venugopalan are co-chairing the Programme Committee, which is constituted from the entire Executive and selected members of GHP.

Programme committee:

- Christine Aidala (caidala@bnl.gov)
- John Arrington (johna@anl.gov)
- Matthias Burkardt (burkardt@msu.edu)
- Leonard Gamberg (lp10@psu.edu)
- Ken Hicks (hicks@phy.ohiou.edu)
- Craig Roberts (cdroberts@anl.gov)
- Peter Petreczky (petreczk@quark.phy.bnl.gov)
- Susan Schadmand (s.schadmand@fz-juelich.de)

- Paul Reimer (reimer@anl.gov)
- Raju Venugopalan (raju@bnl.gov)
- Ramona Vogt (rlvogt@lbl.gov)
- Feng Yuan (fyuan@lbl.gov)

The programme will consist of 30min invited talks, 20min contributed talks, and posters. It will canvass a range of topics, which include:

- AdS/QFT, novel phenomena
- Continuum QCD and Phenomenology
- Exotic hadrons
- Future facilities
- Lattice QCD
- Light and heavy quark mesons and baryons
- Nucleon spin physics and hadronic structure
- Physics of the quark-gluon plasma
- Physics of gluon saturation

A GHP business meeting is scheduled for Wednesday Evening, April 8th.

The GHP Executive would like to express gratitude for generous sponsorship of GHP2015 by Brookhaven National Laboratory and the Thomas Jefferson National Accelerator Facility.

2 APS April Meeting, 2015

11 – 14 April, Baltimore, MD
<http://www.aps.org/meetings/april/index.cfm>

2.1 GHP Program

GHP participates in the annual APS April Meeting, which is also the primary meeting of the unit in even years. Roughly 100 of our members attend the APS April meeting each year. This year GHP is sponsoring or co-sponsoring three sessions:

- Monday, April 13, 2015 – 10:45AM
 Session R3: The Physics of EIC (Sponsors: DNP & GHP)
<http://meetings.aps.org/Meeting/APR15/Session/R3>
 Invited Speakers: Xiangdong Ji, Kirill Tuchin, Abhay Deshpande

- Monday, April 13, 2015 – 1:30PM
Session S8: Hadron Spectroscopy from JLab to EIC (Sponsor GHP)
<http://meetings.aps.org/Meeting/APR15/Session/S8>
Invited Speakers: Justin Stevens, Reinhard Schumacher, Adam Szczepaniak
- Tuesday, April 14, 2015 – 1:30PM
Session Y10: Hadron Spectroscopy with Heavy Quarks (Sponsors: DPF & GHP)
<http://meetings.aps.org/Meeting/APR15/Session/Y10>
Invited Speakers: Steven Blusk, Jake Bennett, Sasa Prelovsek

Three parallel sessions are also sponsored or cosponsored by the GHP:

- Saturday, April 11, 2015 – 10:45AM
Session B6: Hadronic Physics (Sponsor: GHP)
<http://meetings.aps.org/Meeting/APR15/Session/B6>
- Saturday, April 11, 2015 1:30PM
Session C4 Hadron Structure I (Sponsors: GHP, DNP, DPF)
<http://meetings.aps.org/Meeting/APR15/Session/C4>
- Sunday, April 12, 2015 – 10:45AM (Sponsors: GHP, DNP, DPF)
Session J15 Hadron Structure II <http://meetings.aps.org/Meeting/APR15/Session/J15>

The full program of the April meeting is available at
<http://meetings.aps.org/Meeting/APR15/Content/2893>

At this site one can find numerous other sessions of interest to GHP's membership. One such invited session is

- Tuesday, April 14, 2015 – 1:30PM
Session Y3: The Structure of the Pion (Sponsor: DNP)
<http://meetings.aps.org/Meeting/APR15/Session/Y3>
Invited Speakers: Craig Roberts, Tanja Horn, Liping Gan

Unfortunately, this session has been scheduled simultaneous with Session Y10, described above so a difficult choice will need to be made.

The GHP program was formulated by

2014 GHP Program Committee, charged with preparing for April 2015

Peter Petreczky petreczk@quark.phy.bnl.gov	Ken Hicks hicks@ohio.edu	Craig Roberts cdroberts@anl.gov	Raju Venugopalan raju@bnl.gov
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Peter Petreczky was Chair.

2.2 Lunch with the Experts

GHP will sponsor one table at “Lunch with the Experts” on
Sunday, April 12 from 12:00 noon to 1:30 pm.

The expert in question is John Arrington, Leader of the Medium Energy Group at Argonne and a Past Chair of the GHP, whose focus is *Nuclear Physics: nuclei, nucleons and quarks*. If you have students interested in this topic, encourage them to sign up for our table so that John won't have to eat lunch alone.

2.3 April 2016

Moving on to next year, **Raju Venugopalan** will serve as Chair of the GHP's 2015 Program Committee. He will soon begin forming a four-person committee to begin planning for April 2016.

The 2016 April Meeting is scheduled for

16-19 April 2016, Salt Lake City, UT.

<http://www.aps.org/meetings/meeting.cfm?name=APR16>

3 Membership

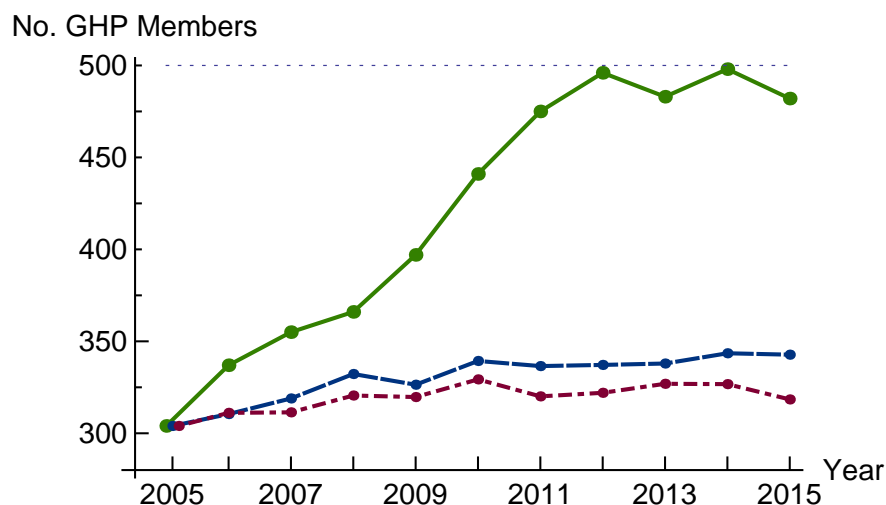


Figure 1: *Solid line* – GHP membership, true value, with “2015” representing the APS Official Count at the beginning of 2015; *long-dashed* – DNP membership normalized to GHP’s value in 2005 (2401 → 304); and *dot-dashed* – DPF membership normalized to GHP’s value in 2005 (3291 → 304).

At the beginning of 2015, the APS Unit Membership Statistics list GHP with 482 members, which represents 0.94% of APS membership. This represents a loss of 16 members (3%) since January 2014. In this connection, it is notable that membership in DNP dropped by 6 people (0.2%) and that in DPF fell by 90 (2.5%).

There are fourteen Topical Groups listed in the January 2015 Unit Membership Statistics. This reflects the appearance of a new Topical Group on Soft Matter

<http://www.aps.org/units/gsoft/>.

Of these Groups, GHP is now one of the smallest, ranked 9th in terms of membership. Notably, however, the Topical Groups “Instrument and Measure Science,” “Magnetism,” “Physics of

Climate” and “Shock Compression” lost a greater fraction of their members in the past year.

Notwithstanding these observations, a drop in membership is typical for a year in which there is no GHP meeting, as apparent in Fig. 1. The Executive still hopes that membership will grow again as we approach the 6th *Biennial Workshop of the GHP*, for which the structure of registration fees favours GHP members, as described in Sec. 1.

So long as GHP membership remains at a level of approximately 500, we will be able to make two regular-fellowship nominations in 2016, which is a continuing excellent boost for Hadron Physics. (See Sec. 4.)

Membership in a strong GHP brings many benefits. A vital GHP

- establishes and raises the profile of Hadron Physics in the broader physics community, e.g., by nominating members
 - to APS governance committees,
 - to APS prize and award selection committees,
 - for election to Fellowship in the APS
- has a greater role in planning the program for major APS meetings;
- and provides a vehicle for community action on topics that affect the way research is conducted and funded.

Whether one considers the APS alone, or takes a broader perspective, the impact GHP that can have is primarily determined by the number of members. (It is also influenced by the energy of the Executive.) The Executive urges existing members to encourage their colleagues to join us. We know there are absent-minded people who have overlooked the opportunity to join GHP but many will react positively to a little gentle prodding.

Membership is only \$8. Of this, GHP receives \$5 from the APS. The remainder stays with the APS and covers the many services they provide. They have been very helpful, e.g., in connection with the last three GHP meetings and in the build-up to the 2016 Workshop. With this support we can be an active force for Hadron Physics. The money can be used, for example, to assist with: the GHP Dissertation Award – see Sec. 6; the organization of meetings – such as the forthcoming GHP2015, see Sec. 1; the preparation of publications that support and promote the GHP’s activities; and participation in those fora that affect and decide the direction of basic research.

Hence, if you are reading this newsletter but are not a member of GHP, please join. On the other hand, if you’re already a member, please circulate this newsletter to your colleagues and encourage them to join.

Current APS members can add units online through the APS secure server by following a link on the lower-right of our web page; namely, <http://www.aps.org/units/ghp/index.cfm>.

4 Fellowship

As we noted in the December 2014, Colin Morningstar (Carnegie Mellon University) and Stepan Stepanyan (JLab), were both elected to Fellowship in the APS under the auspices of the GHP:

Colin “For his outstanding contributions to understanding the strong force and its hadron spectroscopy based on the fundamental theory of Quantum Chromodynamics;”

and Stepan “For pioneering research to access generalized parton distributions through deeply virtual exclusive processes and the 3-dimensional imaging of the nucleons quark structure, and for the development of innovative experimental methods and apparatus in medium energy hadron physics.”

The Executive would like to take this opportunity 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 neighbourhood of 500 members, we are allocated TWO Regular nominations.

The Executive urges members of GHP to be prepared in 2015 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.

The instructions for nomination may be found at <http://www.aps.org/programs/honors/fellowships/nominations.cfm>
The entire process is now performed on-line.

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

- Ensure the nominee is a member of the Society in good standing. The on-line 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 on-line 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 up-loaded 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, in practice it is preferable that sponsors be APS Fellows.
- The nomination process should be complete prior to GHP’s deadline:

Monday 1st June 2015

The APS will subsequently forward the nominations to the GHP Fellowship Committee, which this year is

2015 GHP Fellowship Committee

Zein-Eddine Meziani meziani@temple.edu	Jianwei Qiu jqiu@bnl.gov	Paul Reimer reimer@anl.gov
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Paul Reimer is Chair. Do not hesitate to contact Paul or his colleagues on the committee if you have questions.

5 Elections

Elections for three posts in the GHP Executive will open in October 2015. We will fill three positions on GHP's Executive Committee:

- Vice-Chair (Raju Venugopalan will become Chair and Paul Reimer will become Chair-Elect, leaving the position of Vice-Chair vacant. Naturally, Peter Petreczky will become Past-Chair, whilst Matthias Burkardt will leave the Executive Committee after four years service.)
- Secretary/Treasurer (Craig Roberts will have completed his second term in this position.)
- and one Member-at-Large (Christine Aidala will by then have completed her stint.)

Our rules state that: *the Committee shall nominate at least two candidates for the offices of Vice-Chair and Secretary/Treasurer, 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, who is*

Matthias Burkardt (burkardt@nmsu.edu)

this year; and shall include three members in addition to its Chair, one of whom shall be appointed by the APS.

It is planned that in August, 2015, the Nominating Committee will solicit input from the GHP membership. The nomination of candidates will likely close on Fri. 4 September and an electronic ballot will subsequently be held over a five week period: 12 October – 13 November.

We urge GHP members now to begin considering whom they would like to see filling the three open positions in 2015 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.

NB. The APS stipulates that we state the following: "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 under-represented minority groups, and scientists from outside the United States."

6 Thesis Prize

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.

The 2015 winner, Daniel Pitonyak, was announced in the [December 2014 GHP Newsletter](#). Daniel will receive his Award at GHP 2015 and also deliver a plenary presentation at that Workshop.

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 proceed, 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.

In the meantime, it is currently anticipated that nominations for the Third GHP Dissertation Award will be open until 3 October 2016. All nominations received before that date will be considered by a review committee, which will be established in due course. The Committee will be chaired by Raju Venugopalan (raju@bnl.gov), who will be immediate Chair of the GHP Executive Committee at that time.

So, as your students prepare for graduation during the next eighteen months, the Executive encourages you to consider whether you would like to nominate them for the GHP Award. If you have a good candidate, then please submit the nomination package to Raju Venugopalan, with a copy to the Sect./Treas. (Craig Roberts, cdroberts@anl.gov). All packages will be 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%).

For more information, including “Rules and Eligibility”, please check the APS web-site: [Dissertation Award in Hadronic Physics.](#)

7 2015 Long Range Plan

Documents summarising the September Town Meetings at Temple University have been posted to arXiv:

- “Exploring the properties of the phases of QCD matter,” U. Heinz *et al.*, [1501.06477](#)
- “QCD and Hadron Physics,” S. J. Brodsky *et al.* [arXiv:1502.05728](#)

As consensus documents that have been deliberated by large sections of the community, these summaries will be given special weight in connection with preparing the new Long Range Plan, which is due by October 2015. A key step in preparing that plan is a five-day resolution meeting, which will take place 16-20 April 2015. Approximately one-half of this meeting is expected to be devoted to receiving more input and to be open to the public, with the rest of the meeting being held in executive session.

Details and “break news” about the Long Range Plan process are available at <http://www.phy.anl.gov/nsac-lrp/>

The President's Fiscal Year 2016 Budget Request for Selected Science Accounts Showing Percentage Changes from Fiscal Year 2015

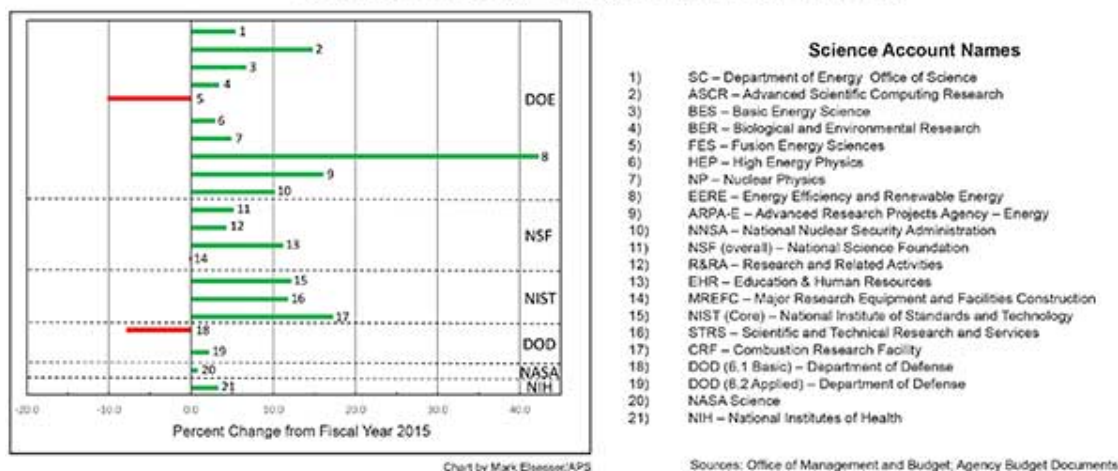


Figure 2: A perspective on the President's FY16 Budget Request.

8 Science Funding

The APS maintains a web-page devoted to the observation of Capitol Hill: <http://www.aps.org/publications/capitolhillquarterly/index.cfm>. This site provides a regular snapshot of the state of interactions between science and government.

Of some interest, perhaps, is Fig. 2, which shows the relative change, with respect to FY15, in the President's FY16 Budget request for selected science accounts. The President's FY16 request was submitted to Congress on 2 February 2015.

The request has the "three key basic research agencies," *viz.* The National Science Foundation, Department of Energy Office of Science, and the laboratories of the National Institute of Standards and Technology, receiving a 5.3% increase (\$0.7 billion above the FY15 amount of \$13.8 billion).

Unsurprisingly, the initial reaction from the Chairman and Ranking Member of the House Science, Space, and Technology Committee differed significantly: [Chairman's comments](#); and [Ranking Member's Comments](#).

9 Meeting Summaries

9.1 Highlights of – LIGHT-CONE 2014: Theory and Experiment for Hadrons on the Light-Front

(Communicated by Chueng-Ryong Ji <crji@ncsu.edu> and Wally Melnitchouk <wmelnitc@jlab.org>.)

The 2014 edition of the Light-Cone meeting took place at North Carolina State University (NCSU) in Raleigh, North Carolina on 26-30 May (<http://www.physics.ncsu.edu/LC2014/>).

The local organizing committee consisted of C.-R. Ji (Chair, NCSU), J. Blondin (NCSU), H.

Gao (Duke), D. Lee (NCSU), W. Melnitchouk (Jefferson Lab), T.Schäfer (NCSU), M. nsal (NCSU), with L. Cochran and R. Bennett providing administrative support. This series of meetings is held under the auspices of the International Light Cone Advisory Committee (ILCAC), Inc. (<http://www.ilcacinc.org>). The Workshop was supported in part by generous contributions from Jefferson Lab, the College of Sciences at NCSU, and the NCSU Department of Physics. In particular, the support from NCSU allowed ILCAC to award this year's McCartor Fellowships to four young physicists, enabling them to attend the conference and present the results of their research.

LIGHT-CONE 2014 had over 70 participants, who presented a total of 65 talks and 4 posters. An emphasis on the interface between theory and experiment in hadron physics was a feature of this year's meeting, with several experimental talks from Jefferson Lab (R. McKeown, L. Elouadrhiri) and COMPASS at CERN (A. Ferrero, I. Choi), discussing recent results and future perspectives for hadron physics at their facilities.

The workshop covered many topics in hadron phenomenology related to the 12 GeV upgrade at Jefferson Lab, including nucleon generalized parton distributions (GPDs) (F. Wang, Y. Zhao, S. Liuti) and deeply-virtual Compton scattering (B. Pasquini), Compton form factors (B. Bakker), transverse momentum dependent distributions (TMDs) (D. Boer, A. Metz), and parton distribution functions (P. Jimenez-Delgado). There was discussion of flavor asymmetries in the nucleon sea (J.-C. Peng, W. Melnitchouk), the deuteron b_1 structure function (G. Miller), the ^3He spectral function (S. Scopetta) and the pion distribution amplitude (A. Radyushkin, N. Stefanis).

A variety of other, more formal theoretical topics in QCD and QED were also presented, including chiral symmetry breaking and confinement (P. Hoyer, I. Cloet, M. Schindler), Bethe-Salpeter and Dyson-Schwinger equations (P. Tandy, A. Bashir, M. Viviani, V. Karmanov), light-front models (G. Salme, T. Pena, H. Choi), and issues involving bound states and zero-modes (W. Polyzou, T. Frederico, A. Ilderton). Recent progress in light-front holography and AdS/QCD (R. Sandapen), as well as computational developments in many-body dynamics (J. Vary) was also highlighted. Among some of the more stimulating presentations were those on issues related to the proton spin (C. Lorce), the proton charge radius (S. Glazek), GPDs and TMDs, as well as light-front chiral sum rules (S. Beane). The closing presentation was given by S. Brodsky.

A half-day excursion was made to several local museums (Art, History, Natural Sciences) and was followed by the Workshop dinner. During the dinner proceedings, the Chair of LC2014 and ILCAC, C.-R. Ji, presented awards to the four McCartor Fellowship recipients: Tim Hobbs (Indiana University), Yang Li (Iowa State University), Greger Torgrimsson (Chalmers University of Technology, Sweden) and Jai More (Mumbai University, India).

The Proceedings of the workshop will be refereed and published as a special issue of Few Body Systems. The detailed program and all the presentations can be found at the workshop website, <http://www.physics.ncsu.edu/LC2014/>.

The next meeting will take place at Frascati during the week 21-25 September 2015. Details are available at http://www.roma1.infn.it/conference/light_cone_2015/.

10 State of the Laboratories

10.1 JLab – 2014 in Review and Prospects for 2015

(Communicated by R. D. McKeown – bmck@jlab.org.)

Thomas Jefferson National Accelerator Facility (JLab) successfully completed the 6 GeV experimental program on May 18, 2012, and has since been fully engaged in preparing for the 12 GeV era. This report will begin with some highlights of new results emerging from the 6 GeV running. The progress on the 12 GeV upgrade project will then be summarized, followed by a brief discussion of the 12 GeV science program.

Some Recent Science Highlights

A measurement of the parity-violating asymmetry in deep-inelastic electron-deuteron scattering was published in *Nature*. It studied a rare instance of symmetry breaking in electron-quark scattering, and provided a new determination of an intrinsic property of quarks that's five times more precise than the previous measurement. When combined with previous experiments, like Qweak, the result provides a mass exclusion limit on the electron and quark compositeness and contact interactions of ~ 5 TeV.

The $\Lambda(1405)$ was established more than 50 years ago. Yet, two key properties of the $\Lambda(1405)$ – its spin and parity – though believed to be known have never been determined experimentally, until now. In a CLAS experiment, a polarized $\Lambda(1405)$ was produced by photo-production from a proton target. By measuring its decay, and the polarization transfer from the $\Lambda(1405)$ into the Σ^+ particle, one of its decay products, the analyzers could finally experimentally determine its spin to be $\frac{1}{2}$ and its parity to be negative. The results were published and highlighted in *Physical Review Letters*, and on DOE Science News.

An article reporting on separated response function π^-/π^+ ratios in exclusive pion electro-production following Hall C experiments appeared in *Physical Review Letters*. The longitudinal response function ratio indicates the dominance of the pion-pole diagram at small- t , whereas the transverse response function ratio shows a transition from pion knockout to quark knockout mechanisms.

Three articles presenting results from Hall A were accepted to appear in one identical (early July) *Physical Review Letters* issue. The accepted articles cover a range of science topics, from measurements of short-range nuclear structure probing the repulsive core, to determination of a spin-dependent structure function moment as a probe of color forces, to single-spin asymmetries in semi-inclusive scattering.

A pioneering study of inelastic $\pi K - \eta K$ coupled-channel scattering in Lattice QCD was published in *Physical Review Letters*.

A study of short-range NN correlations in heavy nuclei based on CLAS data taken in 2004 was published in *Science*. The study demonstrated that the predominance of n - p pairs, first observed earlier in Carbon, persists in heavy, neutron-rich nuclei.

12 GeV Upgrade

As discussed in the last newsletter, the 12 GeV upgrade project continued to make excellent progress during 2014. The goal of this project is to double the maximum beam energy to 12 GeV, implement enhanced experimental hardware in the existing experimental halls, and construct a new Hall D to accommodate the novel GlueX experiment. The overall construction project is presently approximately 92% complete. DOE approved the 12 GeV accelerator upgrade complete and the start of initial operations in July.

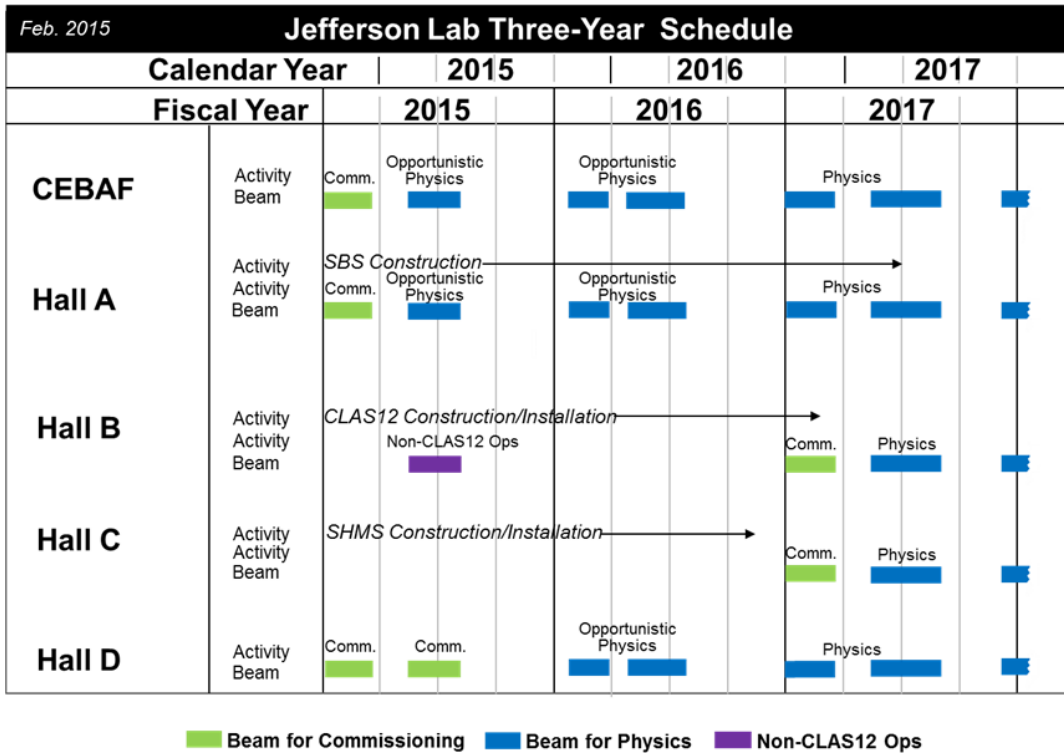


Figure 3: Anticipated schedule at JLab for the next three years.

The experimental equipment continues to make good progress. Hall D is essentially complete and is in commissioning mode. Hall C magnet construction for the SHMS spectrometer is making good progress; the Q1 magnet was recently received and the HB magnet is due shortly. In Hall B, good progress was made with completed installation of three detectors on the CLAS12 forward carriage. Assembly of the CLAS12 torus magnet is proceeding as the coils are delivered from Fermilab. The solenoid construction will hopefully begin soon.

Beam commissioning resumes in February 2015 with the first operation of the 750 MHz beam separators to enable simultaneous delivery of 5-pass beam to Halls A, B and D. Ramp up to full energy operation is expected this Autumn. We expect commissioning in Halls B and C to begin in Autumn 2016.

Schedule

During the next three years, the Lab will transition the 12 GeV CEBAF and experimental equipment from construction to commissioning to physics production running. Subject to the availability of sufficient operating funds, the Lab anticipates the schedule for the next three years to be as illustrated in Fig.3.

Other Projects

The Super BigBite Spectrometer construction is proceeding well, with anticipated completion on schedule in FY17.

The Heavy Photon Search (HPS) experiment in Hall B is completing installation and is on schedule to initiate an engineering run in a few weeks.

Prad, the proton radius experiment, construction is nearly complete but it does not appear that there will be an opportunity to schedule beam in FY15.

The SoLID (Solenoidal Large Intensity Device) collaboration has submitted a pre-CDR in preparation for a Director’s Review, scheduled for Feb. 23-24, 2015.

DIRC bars from the Babar experiment at SLAC will become available for GlueX. This will enable GlueX to enhance its particle identification capability.

The RICH sector for CLAS12 is under construction. A second sector will be constructed as a result of additional funding from INFN.

Phase 1 construction of the DarkLight experiment was funded by an NSF MRI and installation at the Jefferson Lab free electron laser lab is expected in FY16.

The science case for the MOLLER experiment was reviewed by an expert panel. The final written report is expected shortly.

12 GeV Physics Program

During the last few years, the JLab user community, in collaboration with JLab staff, has developed an impressive set of experiment proposals for the 12 GeV program. These have been reviewed by the Jefferson Lab Program Advisory Committee (PAC), resulting in a total of 70 experiments being approved. All of these experiments have been assigned a nominal recommended beamtime allocation and scientific priority. These proposed experiments represent more than 4000 PAC-days of approved beamtime, which translates into more than 10 years of running at full simultaneous 3-hall operation during the 12 GeV era of CEBAF. The PAC held a special meeting, PAC41, in May 2014 to assess the priorities of approved experiments for the first 5 years of 12 GeV running. A subset of the approved proposals corresponding to 643 PAC days were selected as “high impact” experiments that should receive priority for scheduling during the first 5 years.

PAC43 will be held in July 2015, and will review newly submitted proposals. Proposals are due 8:00 a.m. EDT (Eastern Daylight Time) on Monday, May 18, 2015.

Acknowledgment: I would like to thank H. Montgomery, Rolf Ent, Allison Lung and Mike Pennington for their assistance in preparing this report.

10.2 RHIC in 2015

(Communicated by Jamie Dunlop – dunlop@bnl.gov.)

The 15th run of RHIC began with collisions for physics measurements on February 10th this year, and will continue until June. The focus this year is on polarized physics, both between polarized protons and, for the first time, in the collision of polarized protons on Au and likely Al nuclei. This set of measurements focus on three distinct programs: on improving the precision of gluon polarization in the proton via longitudinally polarized proton-proton collisions, on understanding the origin of the large transverse single spin asymmetries both with transversely polarized proton-proton and proton-ion collisions, and on understanding what phenomena occur in small systems, both in modifications of the incoming nuclear wavefunction relative to the proton and in the possibility of creating hot, flowing matter even in the small overlap zone between protons and ions. These programs are made possible by improvements to both the collider itself, in the implementation of electron lenses to double polarized proton luminosities, and by a suite of detector upgrades to both STAR and PHENIX.

On the collider side, Run 15 will be the first run in which the electron lenses are used to compensate for the beam-beam effect that limited proton luminosity in previous runs. In the electron lenses, beams of negatively charged electrons are used to compensate for the repulsion

of the positively charged proton beams when the beams are brought into collision at the experimental interaction regions. This repulsion limits the maximum intensity of protons that can be effectively used in RHIC; in previous years, beyond a certain level of intensity, the lifetime of the beams suffers dramatically, effectively placing an upper bound on the integrated luminosity the machine can deliver. The electron lenses will alleviate this bound, projected to increase the average proton-proton luminosity in the machine by approximately a factor of two. One program this increased luminosity will greatly benefit is the determination of the gluon polarization in the proton, which from previous measurements was found to be significantly non-zero in the region accessed at RHIC, 0.20 ± 0.06 at 90% Confidence Level for $x > 0.05$ at $Q^2 = 10 \text{ GeV}^2$ from the DSSV global analysis.

Another program that will benefit from the increased luminosity, and also from detector upgrades, is the program using transversely polarized beams. Single-spin asymmetries, in which one looks at imbalances in particle production relative to an upward or downward polarized proton colliding with an unpolarized object, are large at RHIC: in certain kinematical regions the relative probability to produce particles to the left vs the right is different by a factor of two. The origin of these asymmetries is still unclear, though much theoretical work has produced a compelling connection between the asymmetries and the intrinsic transverse momentum distributions of partons in the proton. Despite this, there remains a significant ambiguity in the origin of the effects, as to the relative contribution from initial-state imbalances in the proton leading to an imbalance in the momentum of the quarks themselves, known as the Sivers effect, or from a combination of the transversity distribution of quarks in the proton and polarization-dependent fragmentation of the quark into hadrons, known as the Collins effect. Increased luminosity and detector capability will lead to significant progress in resolving these different contributions. Collins-related asymmetries can be separated with special fragmentation functions, Interference Fragmentation Functions, while both STAR and PHENIX have upgraded their forward instrumentation to measure direct photons, which at leading order do not participate in fragmentation, and so are mainly sensitive to Sivers-like contributions. Additionally, a first look at gluon Generalized Parton Distributions, closely related to the orbital angular momentum of the gluons in the proton, will be possible by combining very forward proton tagging, enabled by an upgrade to the STAR Roman Pots, with the measurement of J/Ψ at mid-rapidity.

The polarized proton collisions will be followed by collisions between polarized protons and unpolarized nuclei, first Au and likely followed by Al. While RHIC was designed from the beginning to allow for collisions between protons and nuclei, this will be the first run that uses this capability. This will allow for the full suite of transversely polarized measurements to be repeated with nuclear “targets”. The change in these asymmetries with increased nuclear size is *terra incognita*, but has been predicted to be sensitive to the modifications of the wave function in the nucleus, including saturation of the gluon fields in the nucleus, hints for which have previously been seen in collisions between deuterons and nuclei. Beyond asymmetries, measurement of the modification of the yield of direct photons in the forward direction also provides a clean measurement of the modification of the gluon distribution in nuclei. This new set of collisions also provides a clean testing ground for the creation of flowing matter in such small colliding zones, by comparing and contrasting the correlation patterns among collisions between protons, deuterons, and ^3He on ions at RHIC energies, and also in comparison to data from $p+\text{Pb}$ collisions at the higher energies of the LHC.

Both PHENIX and STAR have implemented upgrades to enable these measurements, and also to serve as a testing ground for the technologies of the future. PHENIX has installed a compact tungsten-silicon hybrid detector, the MPC-EX, in front of its forward tungsten

calorimeter, the MPC. This detector combines the high density of tungsten with the fine spatial resolution of silicon to separate closely spaced particles. This allows for dramatic rejection of backgrounds to the direct photons, which would otherwise completely overwhelm the signal. STAR has placed a Pb-scintillator pre-shower detector in front of its refurbished forward Pb-glass calorimeter, the FMS, which is similarly used to suppress backgrounds to the direct photon signal. This FMS pre-shower detector is the first large-scale detector at RHIC to use silicon photomultipliers, and so will provide a wealth of data on the performance of this technology in the RHIC environment. Silicon photomultipliers are the current technology of choice for the readout of the large-scale calorimeters envisioned both for a major upgrade to the PHENIX detector at RHIC and for any future detector at the EIC, so understanding how they perform in a realistic environment is crucial.

STAR has also moved its Roman Pots closer to the main experiment, into a region of the beamline where the acceptance in the transverse kick to beam protons is higher and where the Roman Pots can run without special beam conditions. The combination of the high-statistics ability to tag diffractive processes, where the proton remains intact, and the full power of the rest of the STAR detector enables a number of new programs. It will enable high-statistics searches for glueball signals in diffractive processes, along with the previously mentioned tagged J/Ψ measurements in both transversely polarized $p + p$ and $p + A$ collisions to get a first look at generalized parton distributions of the gluon.

Beyond the new programs, Run 15 serves as a key component of the 3-year heavy flavor campaign at RHIC. Both the PHENIX and STAR silicon systems are at top performance. The STAR Heavy Flavor Tracker, the first successful use of Monolithic Active Pixel Silicon detectors in a collider environment, has been refurbished and upgraded to use aluminum rather than copper signal wires, greatly decreasing its mass and improving its ability to tag heavy-flavor decays. Run 15 provides crucial reference data, both in elementary $p + p$ collisions and in cold nuclear matter, with which to understand the measurements from Au+Au collisions in Run 14. The current plan is to follow up with Au+Au collisions again in Run 16, which is expected to produce nearly an order of magnitude higher statistical power from collider and detector improvements.

11 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:

- [XIII Hadron Physics](#): XIII International Workshop on Hadron Physics (Hotel do Bosque, Rodovia Mário Covas, RJ, Brazil) 22-27 March 2015
- [Wksp. of the APS Topical Group on Hadronic Physics](#) (Baltimore, MD) Apr. 8-10, 2015
- [APS April Meeting 2015](#) (Baltimore, MD) Apr. 11-14, 2015

- [DIS 2015](#) – XXIII Int. Wksp. on Deep-Inelastic Scattering and Related Subjects (Dallas, TX) Apr. 27-May 1, 2015
- [PWA8/ATHOS3](#): Int. Wksp. on Partial Wave Analysis for Hadron Spectroscopy (Ashburn, VA) Apr. 13-17, 2015
- [IPAC 15](#) – 6th Int. Particle Accelerator Conf. (Richmond, VA) May 3-8, 2015
- [WNPAFT2015](#) – 5th Workshop on Nonperturbative Aspects of Field Theories (Morelia, Mexico) 4-8 May 2015
- [CHARM 2015](#) – 7th Int. Wksp. on Charm Physics (Detroit, MI) May 17-23, 2015
- [FB21](#): 21st Int. IUPAP Conf. on Few-Body Problems in Physics (Chicago, IL) May 18-22, 2015
- [CIPANP 2015](#): 12th Conf. on the Intersections of Particle and Nuclear Physics (Vale, CO) May 18-24, 2015
- [NStar 2015](#): 10th International Workshop on the Physics of Excited Nucleons (Suita Campus, Osaka University, Japan) 25-28 May 2015
- [QCD Evolution 2015](#): JLab, May 26-30, 2015
- [2015 JLab Users Group Mtg.](#) (Newport News, VA) Jun. 1-3, 2015
- [2015 Int. Summer School on Reaction Theory](#) (Bloomington, IN) Jun. 8-19, 2015
- [NNPSS15](#) – 2015 National Nuclear Physics Summer School (Lake Tahoe, CA) Jun. 15-25, 2015
- [CD2015](#): 8th Int. Wksp. on Chiral Dynamics (Pisa, Italy) Jun. 29-Jul. 3, 2015
- [Hard Probes 2015](#): (Montréal, Québec, Canada) June 29-July 3, 2015
- [CTEQ Summer School](#) – QCD and Electroweak Phenomenology (Pittsburgh, PA) July 7-17, 2015
- [Lattice 2015](#) – 33rd Int. Symposium on Lattice Field Theory (Kobe, Japan) Jul. 14-18, 2015
- [7th Wksp. on Hadron Physics in China and Opportunities Worldwide](#) (Kunshan, Jiangsu, China) Aug. 3-9, 2015
- [POETIC6](#) – 6th Int. Conf. on Physics Opportunities at an Electron-Ion Collider (Palaiseau, France) Sep. 7-11, 2015
- [Hadron 2015](#) (Newport News, VA) Sep. 13-18, 2015
- [Light-Cone 2015](#) (INFN National Laboratories, Frascati, Italy) 21-25 September 2015
- [Quark Matter 2015](#) (Kobe, Japan) September 27 - October 3, 2015
- [EmNN*](#) – Workshop on Nucleon Resonances: From Photoproduction to High Photon Virtualities (Trento, Italy) Oct. 12-16, 2015
- [Fall Meeting](#), APS Div. of Nuclear Physics (Santa Fe, NM) Oct. 28-31, 2015

- [EINN2015](#) – 11th European Research Conf. on EM Interactions with Nucleons and Nuclei (Paphos, Cyprus) Nov. 1-7, 2015
- [INPC2016](#): Int. Conf. on Nuclear Physics (Adelaide, Australia) Sep. 11-16, 2016

GHP's 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

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THIS GHP NEWSLETTER WAS EDITED BY CRAIG ROBERTS FOR THE EXECUTIVE COMMITTEE.