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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 2013: 5th Workshop of the GHP

10-12 April 2013

The Fifth Workshop of the APS Topical Group on Hadron Physics was held over the three days that immediately preceded the April APS meeting:

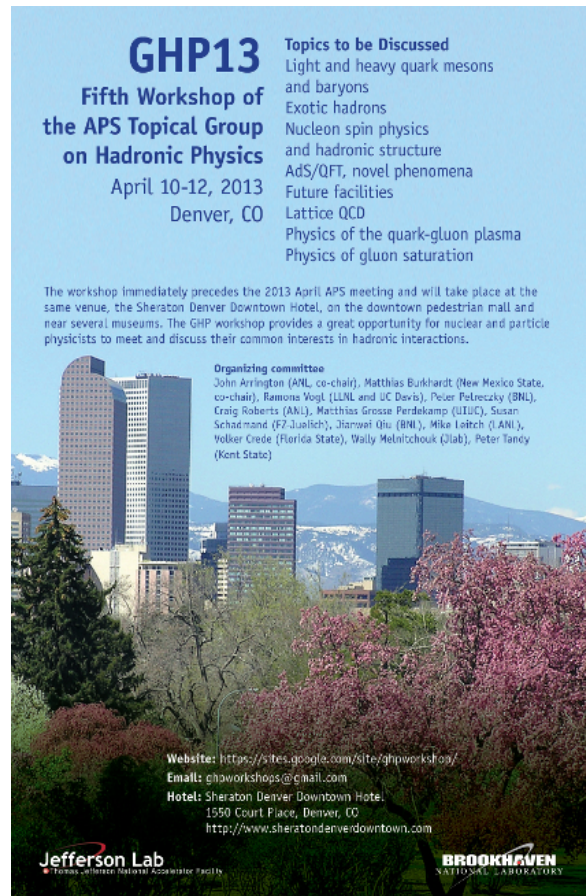
April 10-12, 2013
 Sheraton Denver Downtown Hotel
 1550 Court Place
 Denver, Colorado, 80202

We made an effort to increase student attendance; e.g., through a carefully structure system of registration fees, because the GHP meeting is an excellent opportunity to get an overview of the field while going into more depth than the typical APS talks. In part as a consequence, GHP13 attracted 113 participants, including 30 graduate students, with nearly 100 attending the banquet.

The Organizing Committee was chaired by John Arrington and Matthias Burkardt, and included the GHP Executive committee and selected members of GHP:

Organizing committee:

- John Arrington (johna@anl.gov)
- Matthias Burkardt (burkardt@msu.edu)
- Volker Crede (crede@fsu.edu)
- Mike Leitch (leitch@rcf.rhic.bnl.gov)



- Wally Melnitchouk (wmelnitc@jlab.org)
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- Peter Petreczky (petreczk@quark.phy.bnl.gov)
- Jianwei Qiu (jqiu@bnl.gov)
- Craig Roberts (cdroberts@anl.gov)
- Susan Schadmand (ghpworkshops@gmail.com)
- Peter Tandy (tandy@kent.edu)
- Ramona Vogt (rlvogt@lbl.gov)

The program, with links to the abstracts and talks, can be found on the workshop web page, <https://sites.google.com/site/ghpworkshop/> – once again established and maintained by Susan Schadmand, to whom we are extremely grateful.

The plenary sessions included talks by recent GHP Fellows - Chueng-Ryong Ji (2011), John Arrington (2012) and Nora Brambilla (2012) – as well as physicists who received APS prizes that involved work in hadronic physics: Jinhui Chen (George E. Valley, Jr. Prize), Randolph Pohl (Francis M. Pipkin Award), and Jin Huang (GHP Dissertation Award).

Additional plenary session included spin structure of the nucleon, QCD in nuclei, hadron spectroscopy, and hadronic structure. Speakers in these sessions included: Bernd Surrow (Temple) on gluon polarization from polarized $p + p$ collisions; Zhong-Bo Kang (LANL) on single spin asymmetries; Anselm Vossen (Indiana) on measurements of TMDs; David Gaskell (JLab) on the EMC effect; Adrian Dumitru (CUNY and RIKEN BNL) on small- x physics; Manuel Calderon de la Barca Sanchez (UC Davis) on Heavy Quarkonia in Heavy Ion Collisions; Toru Sato (Osaka) on Nucleon Resonances; Matt Shepherd (Indiana) on BES III results; Simona Giovannella (Frascati) on Rare Meson Decays; Nadia Fomin (LANL) on fundamental neutron physics at the SNS; Jose Goity (Hampton/JLab) on a joint chiral and $1/N_c$ expansion; and David Richards (JLab) on hadron structure using lattice QCD.

The parallel program included sessions on PDFs (including impact from ATLAS), GPDs/DVCS, TMDs, SSAs in SIDIS and $p + p$, future facilities, form factors, two photon exchange, heavy flavor production, EMC effect, hydrodynamics, dilepton production, parity violation measurements, quark and gluon spin structure, hadron spectroscopy, and a good deal more.

The meeting emphasized the continuing strong GHP-participation by the heavy-ion community. It also included a good selection of talks highlighting results from facilities and experiments in Europe and from high-energy facilities

Our thanks to everyone who participated in this interesting and highly successful workshop!

The 6th workshop will very probably take place prior to the 2015 April APS meeting in Baltimore, MD.

2 Thesis Prize

The first GHP Dissertation Award was awarded to Dr. Jin Huang, who received his PhD from the Massachusetts Institute of Technology, Department of Physics, in October 2011, [for the first measurement of double spin asymmetries in charged pion production from deep inelastic scattering on a transversely polarized \$^3\text{He}\$ target.](#)

The Award brought Dr. Huang \$ 1000 and a travel allowance, which he used to attend the GHP13 meeting whereat he delivered a plenary presentation. The award was presented at a special session of the APS April meeting.

At this time the GHP Executive would like to urge GHP's members to begin thinking about suitable candidates for the Second GHP Dissertation Award.

As already noted, the GHP Dissertation Award is a prize of \$ 1000 and a travel allowance of up to \$ 1500. The winner will be invited to deliver a plenary presentation at GHP 2015. Nominations for the Second GHP Dissertation Award will close on

6 October, 2014.

They should be sent to Matthias Burkardt, who will be GHP Chair at that time. In the interim, Matthias will invite four other GHP members to join his five-member Dissertation Award Committee.

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

The GHP Dissertation Award was made possible by 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 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>

3 Elections

Elections are approaching for posts in the GHP Executive. We need to fill two positions on GHP's Executive Committee:

- Vice-Chair (Matthias Burkardt will become Chair and Peter Petreczky will become Chair-Elect, leaving the position of Vice-Chair vacant. Naturally, John Arrington will become Past-Chair, whilst Ramona Vogt will leave the Executive after four very active years.)

- and one Member-at-Large (Jianwei Qiu will have secured his freedom.)

A slate of candidates has been prepared by the

2013 Nominating Committee

Manuel Calderon calderon@physics.ucdavis.edu UC Davis	David Richards dgr@jlab.org JLab	Su Schadmand s.schadmand@fz-juelich.de Forschungszentrum Jülich	Ramona Vogt (Chair) rlvogt@lbl.gov LLNL and and UC Davis
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Biographies and statements are being gathered and stored in the APS on-line voting system. Once that is complete, the ballot will open and run for a four week period; namely:

15 October – 15 November.

An EMail will soon be circulated to GHP members with information on how to vote.

4 Membership

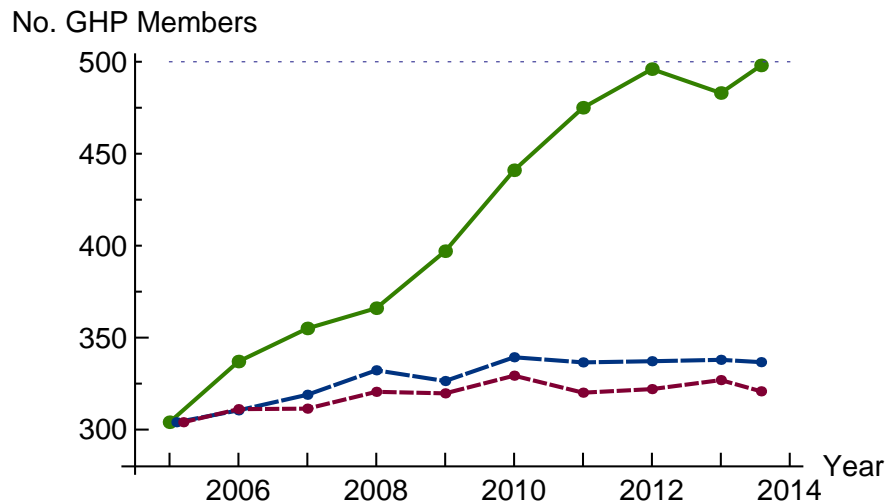


Figure 1: *Solid line* – GHP membership, true value, with the point near “2014” representing the APS Official Count on 1st July 2013; *long-dashed* – DNP membership normalized to GHP’s value in 2005 (2401 → 304); and *short-dashed* – DPF membership normalized to GHP’s value in 2005 (3291 → 304).

As of July 2013, the GHP had 498 members, which represents 1.00% of APS membership. The Group has never had more members. In this connection, it is notable that membership in DNP is roughly static (now 2659, down by 10 members = -0.4%) and DPF has seen a decline (now 3473, a loss of 66 members = -1.9%), which returns DPF to its 2011 level of membership.

At least part of the growth in GHP membership may be attributed to the success of the 5th *Workshop of the GHP*, with its registration fee structure that favored GHP members.

With our membership strong and standing at approximately 500, we will be able to make two regular-fellowship nominations in 2014, which is an excellent boost for Hadron Physics. (See Sec. 5.)

There are now thirteen Topical Groups, the newest of which is *Physics Education Research (GPER)*, which was announced in the July 2013 issue of APS News (<http://www.aps.org/publications/apsnews/201307/upload/July-2013.pdf>).

Of these Groups, the GHP is 7th largest: we define the median. Since the end of 2012, seven Topical Groups declined in membership; and the strongest relative growth was shown by *Few Body Systems (GFB)*, which grew 7% by gaining 20 members.

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
 - Securing two fellowships per year for GHP members
 - Awarding the Biennial Dissertation Award
 - Nominating members
 - * to APS governance committees,
 - * to APS prize and award selection committees,
- 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 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 were very helpful, e.g., in connection with GHP13.) 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. 2; the organization of meetings – such as the recent GHP2013, 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>.

5 Fellowship

Each year the APS allocates a number of Fellowship Nominations to a Topical Group (and to Units in general). That number is based primarily on membership. A strong GHP can nominate more of our members for Fellowship.

In 2013, owing to our level of membership at the beginning of the year, we were again allocated two Regular nominations. It appears likely that this will also be the case in 2014, given that our current membership is almost 500.

In the Executive's view, the election of Fellows under GHP's banner helps materially in raising the profile of hadron physics. Moreover, with so many excellent hadron physicists, a limitation to anything less than two nominations places stresses on our Fellowship Committee.

This year's Committee was

2013 GHP Fellowship Committee

Curtis Meyer cmeyer@cmu.edu	Peter Petreczky (Chair) petreczk@quark.phy.bnl.gov	Ramona Vogt rlvogt@lbl.gov
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We thank them for their efforts, the fruits of which will be announced by the APS in December 2013.

The 2014 Fellowship Committee will be formed after results of our forthcoming elections are known, and will be chaired by the incoming Vice-Chair.

The Executive urges members of GHP to be prepared in 2014 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 deadline for nominations will probably be

7th June 2014

(the APS advises us early in the new year) and 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, which is likely to be

Saturday 7th June 2014

The APS subsequently forwards the Nominations to the GHP's Fellowship Committee.

N.B. Candidates who are not elected in the year they are nominated will automatically be considered again the following year.

6 APS April Meeting, 2014

A topical group is invited to participate in planning the program of major APS meetings. Owing to the level of our membership, we are allotted two full sessions of Invited presentations at the 2014 April meeting, which will take place:

5–8 April, Savannah, Georgia
<http://www.aps.org/meetings/april/index.cfm>

In this connection, the Executive encourages GHP members to submit suggestions to the GHP Program Committee:

2013 GHP Program Committee, preparing for April 2014

Harut Avakian avakian@jlab.org	Matthias Burkardt mburkardt@physics.nmsu.edu	Jianwei Qiu jqiu@bnl.gov
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The Chair of the Committee is **Matthias Burkardt**.

To be of most assistance, a nomination should be EMail-ed to the program committee [chair](#) and provide (it should all fit within a $\frac{1}{2}$ -page)

- Topic (title and short description)
- Rationale as to why the topic is timely
- Speaker (Name and qualifications)

Given the deadline for submission of GHP Invited Session Programs to the APS, the Executive requests that you provide input to our Committee by

11th October, 2013.

Abstract Submission for April 2014

On a related matter, please recall that the GHP now has sorting categories of our own. There are four: “S. HADRONIC PHYSICS”

- S.1 – light mesons and baryons
- S.2 – heavy flavor hadrons
- S.3 – spin structure of the nucleon
- S.4 – QCD effects in medium

These categories are rather broad and should be interpreted as covering both theory and experiment. The first two can be interpreted as covering production, spectroscopy, decay, lattice simulations, exotics, and effective theories, at least. Spin structure includes

measurements of parton densities, polarized measurements, experiments at JLab, RHIC and elsewhere, and future studies such as at the EIC. The last category includes lattice studies at finite temperature and density, gluon saturation at small x in protons and nuclei, cold nuclear effects on quarkonium, energy loss in Drell-Yan production and other many-body effects in QCD.

When submitting abstracts to the April 2014 meeting, please consider choosing one of these categories. GHP's portion of the proceeds from the Meeting increase in proportion to the number of abstracts submitted to its categories.

7 Unit Convocation and Capitol Hill Visits

N.B. In 2014, the Convocation is scheduled for Friday, February 21 through lunch on Saturday, February 22, 2014. As usual, there will be visits to Capitol Hill scheduled for Thursday February 20, 2014.

7.1 Unit Convocation

The Convocation is the gathering of unit officers. It provides for their familiarization with the ways of the APS, and is also an excellent opportunity for unit officers to learn from each other. This year, the Convocation was held at the American Center for Physics (APS Headquarters) in College Park, Maryland on

Friday 22nd February – Saturday 23rd February.

This year, three members of the GHP's Executive took part: Matthias Burkardt, Peter Petreczky and Susan Schadmand. The Convocation began with a brief welcome address by Michael Turner, President of the APS, and an overview of the Structure of the APS and its Executive, delivered by Kate Kirby, Executive Officer of the APS. She also gave the presentation on APS Publications, since Gene Sprouse, the Editor-in-Chief, was not able to make it on time.

This was followed by a shorter overview on APS finances by Joseph Serene. APS currently has over 49 000 members and is in good financial shape. The total operating fund of APS is less than \$20 000, while its assets are valued to almost \$120 000. APS publications continue to be an important source of revenue. However, they also constitute a large part of the expenses, which cannot be significantly reduced, since close to 80% of all publication is electronic. Currently the APS journals employ 50 full time editors (with PhDs) and 100 support staff. Another interesting fact is that APS journals became truly international: only about one third of all published articles are from the USA and just one quarter of the referees are US based, while roughly half of all articles and referees come from Europe.

Further presentations were: by Kate Kirby, an update on the APS strategic plan; Amy Flatten on International Affairs; and Theodore Hodapp on APS Education and Diversity Programs. Requirement for open-access publications was a hot topic during the discussion at the unit convocation since it is not clear how the publication cost will be financed, and publications are an important source of revenue for the APS.

Members of the GHP executive committee were engaged in open forum discussions on how to

better communicate with members and work together with Physical Societies in different Countries. In particular, the possibility of using more help from APS IT specialists in distributing GHP newsletter and using social media was raised. Susan Schadmand proposed to organize joint meetings with the German Physical Society (DPG). This proposal was received well but, as yet, no steps have been taken.

7.2 Capitol Hill

Susan Schadmand and Matthias Burkardt participated in this year's congressional visits. Susan joined a New York group to visit the offices of various representatives and Matthias visited representatives from his home state of NM. Our visit coincided with a congressional recess just before the delegates were due to return and discuss the looming sequestration. Thus, we appreciated that we were received by staff members of the offices who were both competent and accessible.

To representatives from both sides of the aisle, we explained the importance of robust funding of fundamental research for the economy and national security. APS had prepared some excellent brochures for this purpose, which provided examples of federally funded scientific discoveries that eventually led to important applications. We also explained the disastrous consequences of sequestration for the sciences. Matthias met with staffers, one of them, Senator Heinrich's (D-NM) Science Staffer seemed to understand our point very well since he has a B.S. in physics.

Susan's group was initially joined by Michael Lubell (APS Director of Public Affairs) for the visit of Senator Schumer's (D-NY) office, where we talked with the legislative correspondent, Veronica Duron, about the sequester being a disaster for science and, thus, the future. We also discussed the possibly negative implications for high-energy physics, in view of recent suggestions of moving money to nuclear physics. Furthermore, it was stated that the senator has health and education as priorities. Science & Technology and Education are in the focus of Congresswoman Slaughter's (D-NY) office, where we discussed with two staff members. Here, the discussion revolved around technology and education aspects and the congresswoman's approach, with her degrees in microbiology and public health.

An interesting appointment was the meeting with Curt Owens, defense fellow in Congressman Gibson's (R-NY) team. The opinion was that the sequester was to be avoided, in particular owing to the office being strong on defense. (Sequestration actually went into effect on 1 March 2013.) As with all our discussion partners, it was conceded that cutting budgets affects science most harshly. We were asked what science is planning to do and foresees if the sequester happens. The advice was to try and maintain until the budget hurdle is passed.

Finally, Susan went with Fulvia Pilat, from CEBAF/JLab, to see Brent W. Robinson, who is the senior legislative assistant to member of congress Wittman (R-VA). Here, we explicitly discussed the situation and the possible impact of a sequester on the accelerator group, which might have to furlough and then loose expert personnel. (This has thus far not been necessary.)

Overall, the feedback from the representatives was that they understand the importance of funding science, also fundamental research. However, when times get very tough, it seems that their priorities need to be different.

8 Science Funding

An up-to-date commentary on this subject was recently written for *Roll Call* by Michael Lubell. It is available at this link “[Starving future generations](#)”.

In addition, the presentation by Dr. T., J. Hallman (Assoc. Director for Nuclear Physics, Office of Science) to the 27 June 2013 RHIC User Meeting is informative:

“[Hallman.RHIC.Users.Meeting](#)”. Figure 2 is drawn from that presentation (page 6).

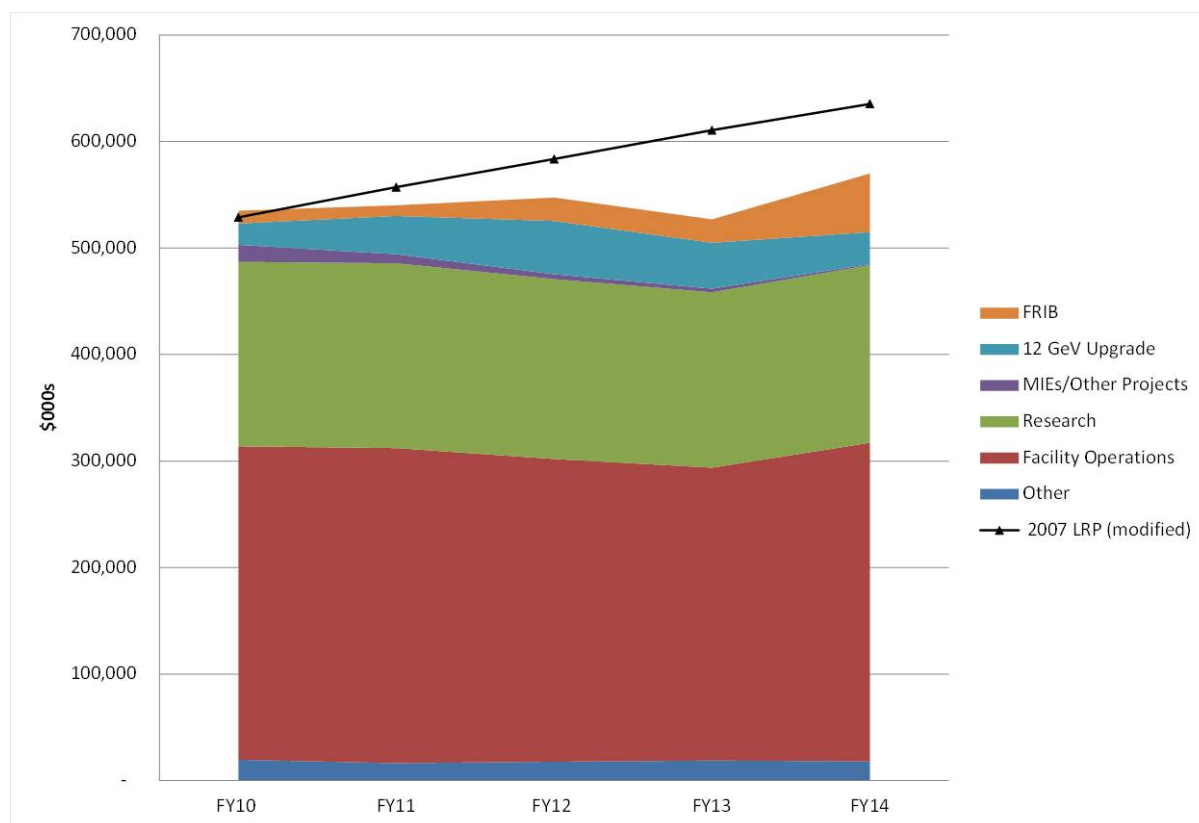


Figure 2: Office of Nuclear Physics budgets as compared with expectations in the 2007 Long Range Plan. It is well to note that FY14 is merely a *request*, whose likelihood for approval the reader may judge for themselves. The sharp dip into FY13 shows today’s situation.

One might contrast the pattern evident in Fig. 2 with the situation in China. The annual budget for the National Natural Science Foundation of China (NSFC), which is China’s largest funding agency for basic research, received a 25% increase over its 2012 budget and has seen an average annual increase of 22% since 1986. This means the NSFC has seen a continuation of the exponential growth we displayed in Fig. 2 of our September 2011 newsletter <http://www.aps.org/units/ghp/newsletters/upload/september11.pdf>.

Prof. Yang Wei, appointed as the new president of NSFC in February 2011, has stated: “We expect double-digit budget growth for the next 5 years. Although increase will be less dramatic than in the past 9 years, we will anticipate growth rate higher than China’s GDP growth rate (forecast to be 7.5 percent in 2013).”

9 Meeting Summaries

9.1 LIGHTCONE 2013⁺: Venturing off the light cone – local vs. global features

(Communicated by Chueng-Ryong Ji <crji@ncsu.edu> and Nico G. Stefanis <N.G.Stefanis@tp2.ruhr-uni-bochum.de>.)

The 2013 edition of the Light Cone meeting was organized by the Institute for Theoretical Physics II (TPII) of Ruhr University Bochum, Germany, and took place at “Skiathos Palace” Hotel on the island of Skiathos, Greece: May 20-25, 2013
<http://www.tp2.ruhr-uni-bochum.de/lc2013/>.

The local organizing committee consisted of N. G. Stefanis (Chair), E. Epelbaum, H. Krebs, M. Polyakov (TPII), and A. I. Karanikas (University of Athens). 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 realized without support from any German, Greek, or European organization, except a donation from the *Gesellschaft der Freunde der Ruhr-Universität Bochum*, which is gratefully acknowledged.

LIGHTCONE 2013⁺ was planned as a purely theoretical meeting with the aim to bring together various experts that work on the topical issue of Wilson lines in the description of transverse-momentum dependent parton distribution functions. It gathered in total 56 participants and avoided by concept parallel and poster sessions. Each day began with 2 to 3 thematic keynote talks of 40 minutes, followed by half-hour talks. The program was arranged in such a way as to give enough time for informal discussions. The main subjects of the Workshop were reviewed in three Special Lectures with a duration of 45 min each. The three lecturers were A. V. Efremov (TMD Phenomenology), S. J. Brodsky (Hadron Physics on the Lightfront) and D. Mueller (GPD Phenomenology). B. Pasquini began the workshop with a talk that covered several aspects of TMD theory and discussed phenomenological applications, while P. Mulders concentrated on theoretical issues related to the factorization of TMD quantities and their path dependence. This subject was also picked up by M. Burkardt, who pointed out that approaches employing different Wilson lines lead to different results for the Wigner distributions. Within the same context, a McCartor Fellowship recipient, A. Vladimirov, presented the derivation of the soft factor, involved in the TMD definition, using techniques akin to those of SCET. N. Brambilla gave an extensive update of Heavy-Quarkonium physics in terms of effective field theories, while A. Vairo employed effective field theories to assess jet quenching observed at RHIC and the LHC. An interesting talk on intense laser fields was given by A. Ilderton. The Time-dependent Basis Light-Front Quantization approach was also used by the McCartor Fellow, X. Zhao, to describe the non-linear Compton scattering and the laser field profile.

During the Workshop dinner, C.-R. Ji and N. G. Stefanis jointly presented awards to this year’s Gary McCartor Fellows: Jai More (Mumbai University), Alexandr Pimikov (Valencia University), Alexey Vladimirov (Lund University), and Xingbo Zhao (Iowa State University). All four fellowships as well as the conference fee waivers were entirely provided by means of TPII and were to cover the expenses incurred by each recipient in attending LIGHTCONE 2013⁺. Chueng Ji (Chair of the ILCAC) introduced the conference participants to the officers of ILCAC and presented the newly elected ILCAC members: Vladimir Karmanov (Lebedev Physical Institute Moscow), Wojciech Broniowski (IFJ PAN Cracow), and Nico Stefanis (TPII Bochum). The next Light Cone meeting was announced to be held at North Carolina State

University, Raleigh, NC, USA, for May 26(M)-30(F), 2014:
<http://www.physics.ncsu.edu/LC2014/>

This year's LIGHTCONE meeting was accompanied by a Satellite Meeting - Friday 24 (second half of the day) and Saturday 25 May, which was devoted to the Euclidean and Minkowskian formulation of the Bethe-Salpeter/Dyson-Schwinger approach and its relation to lattice calculations. This meeting was scientifically organized by B. L. G. Bakker, T. Frederico and L. Tomio, and was attended by a large fraction of the Workshop participants. It was characterized by vivid discussions, in particular after the last talk by G. Cvetic dealing with an analytic coupling in QCD perturbation theory. While this view was supported by N. G. Stefanis and S. V. Mikhailov (creators with the late A. P. Bakulev of the QCD Fractional Analytic Perturbation Theory), it was vigorously opposed by M. Polyakov and D. Mueller.

The Proceedings of the Workshop will be refereed and published in 2014 as a special issue of Few-Body Systems. The detailed program of the Workshop and the Satellite Meeting as well as all (unedited) presentations can be found at <http://www.tp2.ruhr-uni-bochum.de/lc2013/>.

9.2 Baryons 2013 (Scotland)

(Communicated by Ken Livingston (Kenneth.livingston@glasgow.ac.uk) and Dave Ireland (David.Ireland@glasgow.ac.uk).

The *Baryons* series of international conferences started in 1970 at Duke University, and since then it has been held roughly every three years in major cities around the world. This year's conference was hosted by the University of Glasgow, Scotland (<http://nuclear.gla.ac.uk/Baryons2013/>).

There were 149 participants in the meeting, representing 73 institutions in 22 countries spanning 6 continents. There were 26 plenary talks, 8 Keynote talks, 81 contributed talks and 4 poster presentations. Many of the participants had also attended the 3rd CLAS12 European Workshop, which was also held in Glasgow during the preceding week and had a strong focus on recent advances in hadron structure, hadron spectroscopy and future prospects at the upgraded 12GeV Jefferson Lab.

The presentations and discussions at Baryons 2013 covered a wide range of key topics, including

- Spectroscopy: light/heavy flavor hadrons, resonances, exotics, hadronic molecules, spectroscopy and lattice QCD
- Hadron Interactions: meson-meson, meson-baryon and baryon-baryon interactions, anti-proton interactions
- Electromagnetic and weak interactions: photo- and electro-production of hadrons, P- and CP-violating processes in nucleons and nuclei
- Hadrons at finite density and temperature: the QCD vacuum and in-hadron condensates, chiral symmetry, hadron properties, QGP, heavy ion collisions
- Structure of hadrons: form factors, structure functions, GPDs, TMDs, fragmentation functions, intrinsic heavy quarks distributions in baryons

- Recent Approaches to non-perturbative QCD: AdS/CFT correspondence, Dyson-Schwinger equations, lattice gauge theory, effective field theories
- New Facilities and Instrumentation

There were several presentations on the progress in baryon resonances, with new experimental results shown from many different collaborations; and recent, corresponding, developments in QCD-related theory were reported. Other highlights included two presentations (from JLab and Olympus) on two photon exchange, an overview of the rapidly developing programme of heavy photon search experiments and a discussion of new facilities, such as JLab 12GeV, an EIC and the LHCb upgrade.

There was also a public lecture to mark the centenary of the introduction of the term isotope by Frederick Soddy, who did much of his early experimental work in Glasgow.

The next Baryons conference will be hosted by Florida State University in 2016.

9.3 Lattice 2013 (Germany)

(Communicated by Péter Petreczky [⟨petreczk@quark.phy.bnl.gov⟩](mailto:petreczk@quark.phy.bnl.gov).)

The 31st International Symposium on Lattice Field Theory, Lattice 2013, was held at Johannes Gutenberg University, Mainz, Germany from Monday 29th July to Saturday 3rd August 2013. With over 500 participants this was the largest conference of this series so far. Topics discussed at the conference included:

- Algorithms and Machines
- Applications Beyond QCD
- Chiral Symmetry
- Hadron Spectroscopy and Interactions
- Hadron Structure
- Nonzero Temperature and Density
- Physics Beyond the Standard Model
- Standard Model Parameters and Renormalization
- Theoretical Developments
- Vacuum Structure and Confinement
- Weak Matrix Elements

Important progress in lattice calculations of hadron spectrum and hadron structure was described in plenary talks by Christopher Thomas and Sergey Syritsyn. Impressive progress has been made in studying excited hadron states and identifying many hybrid states on the lattice. The role of excited states in determining hadron structure is now better understood and will lead to much more reliable lattice determination of the related quantities in the near future.

A significant fraction of the meeting was dedicated to the study of QCD at non-zero temperature and density. This topic was covered in 3 plenary talks and two sessions running in parallel.

The Ken Wilson award was established several years ago in conjunction with the lattice conference in order to highlight the best work in lattice QCD. The scope of this award changed somewhat this year, and it now recognizes young researchers who have made significant contribution to lattice QCD. The recipient of this year's award is André Walker-Loud from the College of William and Mary, who was recognized for his significant contributions to our understanding of baryons using lattice QCD and effective field.

The next conference, Lattice 2014, will be held in New York, co-chaired by Norman Christ (Columbia University), Bob Mawhinney (Columbia University) and Péter Petreczky (BNL).

10 State of the Laboratories

10.1 Opportunities for the spin physics at the JINR NICA complex

(Communicated by Igor Savin – Igor.Savin@cern.ch.)

The project to construct a new collider for heavy and light ions at the Joint Institute for Nuclear Research (JINR) in Dubna, Russia is proposed and approved by the JINR member states. The collider will be situated at the site of the Laboratory of High Energy Physics and, together with the existing facilities (Nuclotron, experimental hall for fixed target experiments and associated infrastructure), will be included in the NICA complex (Nuclotron-based Ion Collider fAcility).

The project is to be developed in two phases. The first includes construction of the collider and Multi Purpose Detector for heavy ion research, to be completed in 2017. The second phase includes construction of infrastructure for acceleration of polarized and non-polarized protons and deuterons in the c. m. energy range 12-27 GeV per nucleon with luminosity $10^{32} \text{ cm}^{-2}\text{s}^{-1}$ for protons at the highest energy. The proposed scheme of beam manipulations using two partial Siberian snakes permits collider operation in all possible modes of polarization – longitudinal, transversal or non-polarized for each beam.

After SPIN 2012, the 20th International Symposium on Spin Physics, Dubna, 17-22 September 2012, when opportunities for spin physics at NICA were presented to the international community for the first time, a series of dedicated workshops has been organized (<http://nica.jinr.ru/>) aiming to collect suggestions for spin physics experiments at NICA and corresponding requirements for the Spin Physics Detector (SPD).

The main ideas suggested for SPD physics motivations have focused on nucleon spin structure studies using the Drell-Yan (DY) mechanism of lepton pair production and/or mechanisms of direct (prompt) photon and J/Ψ -meson production. It turns out that, with the possibilities expected at NICA and with the 4π -geometry for detection of e^\pm , μ^\pm pairs and photons requested for SPD, one can measure all leading twist Transverse Momentum Dependent (TMD) Parton Distribution Functions (PDFs) in nucleons. These are Boer-Mulders, worm-gear (T&L), Sivers, transversity and pretzelocity PDFs. Some of them have recently been measured in SIDIS experiments; others are still not measured. Verification of the theory-predicted sign-reversal for T-odd TMDs, like Sivers and Boer-Mulders, measured in

SIDIS and DY processes is also mentioned in the physics motivation for SPD.

Polarized DY experiments are also planned at CERN, Fermilab and Brookhaven. The results of these and NICA experiments will be complimentary in the global analysis of the world data on nucleon structure.

The Letter of Intent (LoI) to perform Spin Physics experiments at NICA-SPD with polarized proton and deuteron beams is under preparation. International participation is welcome. The final round of discussions for suggestions to be included in the LoI will be organized during the DSPIN 2013 workshop (<http://theor.jinr.ru/spin/2013/>).

10.2 The XYZ States of Charmonium and the BESIII Experiment

(Communicated by Ryan Mitchell – remitche@indiana.edu.)

The charmonium system – in which a charm quark is bound to an anti-charm quark – has long served as a fundamental tool for studies of quarks and the strong force. In a number of respects it is like the hydrogen atom of the strong force. It is a simple system, yet complex enough to provide subtle phenomena that can test the limits of our understanding – think the Lamb shift of hydrogen. The discovery of charmonium in the mid-1970’s helped to cement acceptance of the reality of quarks; and contemporary advances in the precision of both experimental measurements and theoretical predictions have provided for meaningful quantitative inquiries into aspects of the strong force.

There are unresolved questions, however. Most strikingly, there are a number of new charmonium (or “charmonium-like”) states, the so-called “XYZ” states, that are yet to be satisfactorily interpreted. The gradual discovery of these states over the past ten years has opened the door to a new type of spectroscopy that is perhaps richer than the simple quark and anti-quark picture of charmonium. The “ $X(3872)$,” for example, is unlike any expected charmonium state. It seems instead to have properties consistent with a four-quark system. Moreover, the “ $Y(4260)$ ” exhibits features that make it seem like it could be a bound state of a charm quark and anti-charm quark (like traditional charmonium), but with an excited field of gluons between them, increasing its total mass and changing its quantum numbers.

Sightings of more than a dozen such particles have been claimed; i.e., states that cannot be easily accommodated by a bound charm and anti-charm quark model. Some, like the $X(3872)$ and the $Y(4260)$ mentioned above, are beyond experimental doubt. The status of some others is still in flux.

Somewhat ironically, the majority of these new charm-quark-containing states were discovered by experiments that focus on the production and decay of states containing the heavier bottom quark. The $X(3872)$ was discovered in B decays (composed of one bottom and one up or down quark) by the Belle Experiment at KEK in Tsukuba, Japan; and the $Y(4260)$ was discovered by BaBar at SLAC, using a special kind of e^+e^- collision, where a photon is radiated before the collision. Both Belle and BaBar used e^+e^- collisions that were nominally in the 10 GeV range, ideal for the production of bottomonium states (composed of a bottom and anti-bottom quark), but only rarely (relatively) producing charmonium states, which have masses between 3 and 5 GeV.

In contrast, the BESIII Experiment, operating in Beijing, can directly produce these states using the lower energy e^+e^- collisions provided by BEPCII (the Beijing Electron Positron Collider). In late 2012, BESIII undertook a program to directly produce large samples of $Y(4260)$ decays. To do so only requires tuning the center of mass energy of the collisions to

4.26 GeV, the mass of the $Y(4260)$.

In the first month of running, BESIII had accumulated approximately twice as many $Y(4260)$ decays as the BaBar or Belle experiments; and the first results were quite surprising. It was known before that the $Y(4260)$ decays to $\pi^+\pi^-J/\psi$ but with its increased statistical power, BESIII could now look at the substructure in this decay. Unexpectedly, the charged $\pi^\pm J/\psi$ system showed a clear structure around 3.9 GeV [1] that could not be explained by any $\pi^+\pi^-$ dynamics. This structure was named the “ $Z_c(3900)$.” It was simultaneously reported by the Belle experiment with lower statistics, and then also confirmed by an analysis using CLEO data. It is inherently exotic as it contains charm and anti-charm quarks but also carries an electric charge, which must come from additional quarks. The exact interpretation of the $Z_c(3900)$ is still up for debate, and it is also unclear how (or if) it is related to the $Y(4260)$. However, it is unique in that it is both clearly not a conventional state of charmonium (which can’t be charged) and its experimental signature is beyond doubt (unlike the similar, but questionable, $Z_c(4430)$).

Inspired by this success, the BESIII experiment quickly decided to accumulate a larger sample of $Y(4260)$ decays and it has since approximately quadrupled its sample. More unexpected phenomena were soon noticed. In the $\pi^+\pi^-h_c(1P)$ sample (the $h_c(1P)$ and the J/ψ are charmonium states that only differ by the spin alignment of their quarks), another charged state, the “ $Z'_c(4020)$,” was found in the $\pi^\pm h_c(1P)$ subsystem with more than 8σ significance [2]. This state is quite narrow, about 8 MeV wide, and is presumably related to the $Z_c(3900)$.

One possible clue for the interpretation of these new states is that they appear near open charm thresholds, the minimum masses required to allow decays to two D mesons (each consisting of a charm and an up or down quark). The $Z_c(3900)$ has a mass just above the DD^* threshold, and the $Z'_c(4020)$ is just above the D^*D^* threshold. The BESIII experiment has been able to further explore this piece of evidence by studying the charged DD^* and D^*D^* systems recoiling against a charged pion. Both systems, in fact, show clear enhancements just above their thresholds [3, 4]. Because of their similarities, it is believed that these enhancements are likely related to the corresponding structures in $\pi^\pm J/\psi$ and $\pi^\pm h_c(1P)$.

The BESIII experiment is in a unique position to provide much-needed connections between the XYZ states, like the above connections between the $Y(4260)$, $Z_c(3900)$ and $Z'_c(4020)$. To complete the circuit of X , Y , and Z states (whose naming convention is anyway a little arbitrary), BESIII has also very recently reported the observation of a radiative transition to the $X(3872)$ [4]. Whether or not this is indicative of a $Y(4260) \rightarrow \gamma X(3872)$ transition requires more data at collisions away from the peak of the $Y(4260)$. This would presumably provide crucial information for the interpretation of *both* the $X(3872)$ and the $Y(4260)$.

The year 2013 has so far been an exciting one for the BESIII experiment. Connections between the mysterious XYZ of charmonium are finally becoming apparent. Definitive theoretical interpretations have yet to arrive, but experimental clues are rapidly accumulating. These new results should begin to help discriminate between the many theoretical models that have been inspired by the discovery of the XYZ states; and the BESIII Experiment has much left to explore.

1. M. Ablikim *et al.* [BESIII Collaboration], “Observation of a charged charmoniumlike structure in $e^+e^- \rightarrow \pi^+\pi^-J/\psi$ at $\sqrt{s} = 4.26$ GeV,” Phys. Rev. Lett. **110**, 252001 (2013); arXiv:1303.5949 [hep-ex].
2. M. Ablikim *et al.* [BESIII Collaboration], “Observation of a charged charmoniumlike structure $Z'_c(4020)$ and search for the $Z_c(3900)$ in $e^+e^- \rightarrow \pi^+\pi^-h_c$,”

arXiv:1309.1896 [hep-ex].

3. M. Ablikim *et al.* [BESIII Collaboration], “Observation of a charged charmoniumlike structure in $e^+e^- \rightarrow (D^*\bar{D}^*)^\pm\pi^\mp$ at $\sqrt{s} = 4.26$ GeV,” arXiv:1308.2760 [hep-ex].
 4. C. Z. Yuan for the BESIII Collaboration, “New results on X , Y , and Z states from e^+e^- collider experiments,” talk at CHARM 2013, August 31, 2013.
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11 Forthcoming Hadron Physics Meetings

11.1 Gordon Conference on Photonuclear Reactions

(Communicated by Ronald Gilman (rgilman@physics.rutgers.edu), Lothar Tiator (tiator@kph.uni-mainz.de) and Alberto Accardi (accardi@jlab.org)).

The Gordon Research Conference on Photonuclear Reactions:

From Quarks to Nuclei
August 10-15, 2014
Holderness School, Holderness, NH
<http://www.grc.org/programs.aspx?year=2014&program=photonuc>

is a forum for presentation and discussion of the most recent and exciting results in a wide range of subatomic physics.

As usual The conference will be organized in nine Plenary Sessions and a Poster Session. Expected topics for the meeting include:

- Nucleon structure
- Hadron spectroscopy
- Meson-Nucleon Interactions
- Chiral dynamics
- Few-body systems
- Nuclear systems: exotic nuclei, nuclei at short distances, nuclei and QCD
- New results in QCD theory
- Neutrino physics
- Fundamental symmetries, electroweak probes, and low-energy test of beyond standard model physics
- Dark physics
- Subatomic physics and the universe (QGP and nuclear- and particle-astrophysics)
- Future Facilities and Directions

Since 1959, the Photonuclear GRC has been an arena for new ideas and provided ample and unique opportunities for young scientists and leading researchers to interact in the most scientifically stimulating environment. The Conference web site is indicated above.

As with recent meetings, we anticipate having resources that will allow us to reduce the cost of attendance for graduate students and other younger scientists.

We welcome your suggestions as we work to develop an exciting program.

11.2 Extensive list of meetings on hadron physics

Meetings of interest to GHP's membership are listed at Mark Manley's page: <http://cmr2.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:

- **DSPIN-2013: XV Wksp. on High Energy Spin Physics** (Dubna, Russia) Oct. 8-12, 2013
- **Annual Summer School of the SFB1044 – Low Energy Frontier of the Standard Model** (Bopard, Germany) Oct. 13-16, 2013
- **QCD Frontier 2013** (JLab, Newport News, VA) Oct. 21-22, 2013
- **DNP13:** <http://www.jlab.org/conferences/dnp2013/>. (Newport News, VA) Oct. 23-26, 2013
- **Pacific-Spin-2013:** The 9th Circum-Pan-Pacific Symposium on High-Energy Spin Physics (Ji'nan, China) Oct. 28-31, 2013
- **EINN2013:** 10th European Research Conf. on EM Interactions with Nucleons and Nuclei (Paphos, Cyprus) Oct. 28-Nov. 2, 2013
- **Hadron 2013:** XV Int. Conf. on Hadron Spectroscopy (Nara, Japan) Nov. 4-8, 2013
- **Indiana-Illinois Wksp. on Fragmentation Functions** (Bloomington, IN) Dec. 12-14, 2013
- **HEP2013:** 5th Int. Wksp. on High Energy Physics in the LHC Era (Valparaso, Chile) Dec. 16-20, 2013
- **SNP School 2014:** Int. School for Strangeness Nuclear Physics (Sendai, Japan) Feb. 13-19, 2014
- **APS April Meeting 2014** (Savannah, GA) Apr. 5-8, 2014
- **APFB2014:** 6th Asia-Pacific Conf. on Few-Body Problems in Physics (Adelaide, Australia) Apr. 7-11, 2014
- **Light Cone 2014:** Theory and Experiment for Hadrons on the Light-Front (Raleigh, NC) May 26-30, 2014
- **MESON2014:** 13th Int. Wksp. on Meson Production, Properties and Interaction (Kraków, Poland) May 29-Jun. 3, 2014

- [2014 JLab Users Group Meeting](#) (Newport News, VA) Jun. 2-4, 2014
 - [Lattice 2014](#): 32nd International Symposium on Lattice Field Theory, New York, NY, June 23-28, 2014
 - [Hadron-China-2014](#): 6th Wksp. on Hadron Physics in China and Opportunities in US (Lanzhou, China) July 22-25, 2014
 - [From Quarks to Nuclei](#) – Gordon Research Conf. on Photonuclear Reactions, (Holderness, NH) Aug. 10-15, 2014
 - [PANIC 14](#): 20th Int. Conf. on Particles and Nuclei (Hamburg, Germany) Aug. 24-29, 2014
 - [XIth Quark Confinement and Hadron Spectrum](#) (Saint Petersburg, Russia) Sep. 8-12, 2014
 - [4th Joint Mtg. of the APS Div. of Nuclear Physics and the Physical Society of Japan](#) (Waikaloa, HI) Oct. 14-18, 2014
 - [SPIN 2014](#): 21st Int. Symposium on Spin Physics (Beijing, China) Oct. 20-24, 2014
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