GHP Newsletter February 2007

American Physical Society Topical Group on Hadron Physics

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

Executive Officers

Chair	*Chair-Elect*	*Vice-Chair*	*Past-Chair*
Craig Roberts	Curtis Meyer	Winston Roberts	Ed Kinney
cdroberts@anl.gov	cmeyer@cmu.edu	wroberts@fsu.edu	Edward.Kinney@colorado.edu

Secretary/Treasurer	*Members at Large*	
Wally Melnitchouk	Paul Eugenio	Dave Tedeschi
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NB. EMail addressed to ghpexec@anl.gov will reach all members of the Executive.

Contents

1 Elections

Elections for three posts in the GHP Executive closed at the end of 2006. The new Executive Committee is listed at the top of this newsletter.

On behalf of GHP, the Executive thanks the people who entered their names on the ballots.

In addition, we thank Ted Barnes and Mike Leitch for their service to GHP.

Elections will open again this year in early-November. We will fill two positions on GHP's Executive Committee:

- Vice-Chair (Curtis Meyer will become Chair and Winston Roberts, Chair-Elect, leaving the position of Vice-Chair vacant. Naturally, Craig Roberts will become Past-Chair and Ed Kinney will pass gracefully into retirement.)
- and one Member-at-Large (Dave Tedeschi will by then have completed his stint.)

In October, the Nominating Committee will solicit input from the GHP membership. The nomination of candidates will close on Fri., 26 October and an electronic ballot will subsequently be held over a four week period: 5 November – 3 December.

The 2007 Nominating Committee is

2007 Nominating Committee

Steffen Bass	Craig Roberts	Peter Steinberg
bass@phy.duke.edu	cdroberts@anl.gov	peter.steinberg@bnl.gov

Craig Roberts is Chair. We urge GHP members now to begin considering whom they would like to see filling the two open positions in 2008 and encourage members with ideas to contact someone in the Committee and pass on their suggestions.

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2 Fellowship

We take this opportunity to congratulate *Keith Griffioen*, (William and Mary), and *Wally Melnitchouk*, (JLab), both of whom were elected in 2006 to Fellowship in the APS under the auspices of the GHP: Keith "For definitive experimental studies of the spin structure of the proton and neutron, both in the perturbative, deep-inelastic regime, and in the non-perturbative resonance region;" and Wally "For his theoretical and phenomenological contributions to the study of the quark structure of nucleons and nuclei, in particular that underpinning the nuclear physics program at Jefferson Lab." (NB. The handsome duo are depicted below.)

Wally (left) and Keith (right), 2006 GHP Fellows of the APS, exhibiting their spoils.

This is a good 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.

A strong GHP can nominate more of our members for Fellowship. This year we are allocated ONE Regular nomination and ONE Alternate, for a total of TWO nominations. As we have now seen, two extremely strong candidates will both reach the top!

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

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 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/or 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.
- 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, it is preferable in practice that sponsors be APS Fellows.
- The nomination process should be complete prior to GHP's deadline:
  27th April 2007

The APS will subsequently forward the Nominations to the GHP Fellowship Committee. This year the committee is:

2007 GHP Fellowship Committee

Winston Roberts, FSU	Jonathan Rosner, UofC	Reinhard Schumacher, CMU
wroberts@fsu.edu	rosner@hep.uchicago.edu	schumacher@ernest.phys.cmu.edu

Winston Roberts is Chair. Do not hesitate to contact him or his colleagues on the committee if you have questions.

The Executive urges members of GHP to react quickly to this call for nominations.

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3 Budget: FY 2007 and FY 2008

On 31/January the House of Representatives passed a Resolution that would keep the federal government functioning for the balance of Fiscal Year 2007. During the night of 14/February, the Senate passed the Continuing Resolution (H.J. Res. 20 – vote: 81-15). It was signed by the President on Thurs., 15/February.

The Office of Science receives $200-million more than the sum enacted in FY2006, for a total of $3 796 393 000. Energy Efficiency and Renewable Energy (EERE) receives an additional $300 million for a total of $1 473 844 000.

We note that FY 2005 funding for the Office of Science was $3 599.6-million. In today's dollars, that is $3 798 916 680 (http://www.bls.gov/data/home.htm) so that the amount for FY07 in H.J. Res. 20 is, in real terms, below the funding level of FY05.

At the time of writing, there is insufficient information available for the GHP Executive to evaluate the effect on Hadron Physics of these funding arrangements. We can say, however, that it could have been worse.

The FY 2008 budget request has been submitted. It contains $4.4-billion for the Office of Science. This includes $428-million in funding for basic research in nuclear fusion, including the international fusion energy experimental reactor agreement, known as ITER; $340-million for Advanced Scientific Computing Research; $158-million for operations of the Tevatron at Fermilab for collider and neutrino physics programs; and $146.5-million for operations of the Relativistic Heavy Ion Collider. DOEs FY 2008 request includes $75 million for three Bioenergy Research Centers to accelerate basic research in the development of cellulosic ethanol and other biofuels.

Details of the FY08 budget request are available at
http://www.science.doe.gov/obp/FY_08_Budget/FY_08_Budget.htm.

Some line-items of interest to GHP ($k) – NB. The FY07 numbers are the President's request, which was not delivered. We actually received that which is contained in the continuing resolution:

	FY06	FY07	FY08
Medium Energy Nuclear Physics	103,161	122,781	123,379
Nuclear Theory	28,352	35,348	36,405
Nuclear Physics Construction	2,480	14,520	17,700
HEP Proton Accelerator-Based Physics	362,157	376,536	389,672
HEP Theoretical Physics	47,984	52,056	56,909
HEP Construction	–	10,300	–

New instrumentation initiatives include U.S. contributions to the Italian Cryogenic Underground Observatory for Rare Events (CUORE) project, a neutrino-less double beta decay experiment, and upgrades to the RHIC PHENIX experiment to install new detectors important for both the heavy ion and spin programs.

Funding is requested in the FY 2008 to complete construction of the RHIC Electron Beam Ion Source (EBIS), a joint DOE/NASA project. Critical Decision-2 (CD-2), Approve Performance Baseline, and CD-3, Approve Start of Construction, for the EBIS project were made in FY 2006. The EBIS will replace the aging Tandems as a new pre-injector for RHIC. Project engineering and design funds are provided in FY 2008 for the 12 GeV CEBAF Upgrade at TJNAF to complete design activities; funding is also provided to complete the R&D portion of the project. Critical Decision-1 (CD-1), Approve Alternative Selection and Cost Range, was made in FY 2006.

The budget detail indicates that the FY 2008 request would support upgrades and infrastructure for the three major HEP user facilities: the Tevatron Collider and Neutrinos at the Main Injector (NuMI) at the Fermi National Accelerator Laboratory (Fermilab), and the B-factory at the Stanford Linear Accelerator Center (SLAC). HEP and Basic Energy Sciences (BES) will jointly support B-factory accelerator operations at SLAC throughout the

construction phase of the Linac Coherent Light Source (LCLS). FY 2008 will be the final year of the SLAC linac operations transition to BES.

4 APS April Meeting, 2007

A topical group is invited to participate in planning the program of major APS meetings. This year, GHP is sponsoring one invited session at the April meeting in Jacksonville, Florida: April 14-17, 2007

http://www.aps.org/meet/APR07/index.cfm

The number of sessions can grow if we increase our membership and visibility.

This year's GHP program, Session J2: Hadron Physics, is excellent:

Sunday, April 15

10:30AM - 11:06AM	Highlights from HERMES	Elke-Caroline Aschenauer DESY-Zeuthen and Hall-D, JLab
11:06AM - 11:42AM	Pion Form Factor – Present and Future	Garth Huber U. Regina
11:42AM - 12:18PM	The Quark Gluon Plasma and the Perfect Fluid Quantifying Degrees of Perfection	James Nagle U. Colorado

We also have a shared interest in another session; namely, Session E5: Charm, which we are listed as organizing jointly with DPF:

Saturday, April 14

3:30PM - 4:06PM	Charm Spectroscopy	Alexey Drutskoy U. Cincinnati
4:06PM - 4:42PM	D^0-$\bar{D}^0$ Mixing	Amir Rahimi Ohio State U.
4:42PM - 5:18PM	Charm Decays	Karl Ecklund SUNY, Buffalo

APS April Meeting, 2008

Planning for the 2008 April Meeting will begin in the Autumn. The program committee for the meeting is

GHP Program Committee, preparing for April 2008

Paul Eugenio (FSU) eugenio@fsu.edu	Curtis Meyer (CMU) cmeyer@cmu.edu	Robert Pisarski (BNL) pisarski@quark.phy.bnl.gov

Curtis Meyer is Chairman. GHP Members are encouraged to begin thinking about the program now. Making suggestions early is no crime. The Committee will welcome them, and certainly insist on them once planning begins in earnest. To be of most assistance, a nomination should be EMail-ed to the program committee chairman 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)

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5 GHP06

The *Second Meeting of the APS Topical Group on Hadronic Physics* took place during the period October 22-24, 2006 at the Opryland Resort, Nashville, Tennessee.

The conference web site is http://fafnir.phyast.pitt.edu/GHP06/index.html, and most of the presentations made can be obtained from
http://www.hep.vanderbilt.edu/ johnswe/ghp06/Pgm.html.

Before providing a brief summary of the meeting, the GHP Executive would like to thank Kees de Jager for assistance with the program, and David Ernst and Paul Sheldon for their work in Tennessee, without which the meeting could not have proceeded as smoothly as it did!

Moreover, the GHP Executive and the Conference organisers are grateful for sponsorship from the APS, Jefferson Lab, Brookhaven National Laboratory, Vanderbilt University and Institute of Physics Publishing. We value the continuing support of these institutions.

In connection with Institute of Physics Publishing, we provide a reminder that the *proceedings* of the Second Meeting of the APS Topical Group on Hadron Physics will appear in the open access "Journal of Physics: Conference Series" which is published by Institute of Physics Publishing in the UK. Upon publication the proceedings will be free for all to download.

Conference Overview

Approximately 90 physicists participated in the second meeting of the APS Topical Group on Hadron Physics. The meeting was organised by GHP members Kees de Jager, Craig Roberts, and Eric Swanson, with vital local assistance from David Ernst and Paul Sheldon of Vanderbilt University.

The conference was comprised of seven plenary sessions and eleven parallel sessions, covering a wide range of activities related to strongly interacting matter. Plenary topics included perspectives on pentaquark signals and exotic mesons with gluonic excitations, and the effort at Jefferson Lab to analyse complicated multichannel scattering experiments. These presentations were provided by Cates, Carman, Gothe and Lee. (A brief overview of the Excited Baryon Analysis Center (EBAC) begins on page 11 of this newsletter.)

Exciting new physics related to the "quark gluon liquid" and issues concerning the QCD phase diagram, properties of the quark gluon plasma, and gluon saturation were discussed by Bathe, Steinberg, and Vitev.

Adams, Bernard, Khalatyan, and Rosner summarised the status of charmonium and charm spectroscopy, including several novel states and their interpretation, as measured at B factories.

The talks of the fourth plenary session discussed the strong interaction physics that can be learned from time-like nucleon form factors (Anulli), cascade baryons (Nefkens), and final state interactions in B decays (Petrov).

The relationship of QCD to electroweak physics was explored in the fifth session where Meziani gave an overview of spin structure experiments at Jefferson Lab and Souder and Armstrong discussed the use of parity violating experiments at Jefferson lab to test the Standard Model and measure charge symmetry violation and the strangeness content of the nucleon. Finally a theoretical overview of polarized gluon distributions was presented by Vogelsang.

A plenary session was devoted to lattice initiatives in hadronic physics: Negele discussed the goals and structure of the Lattice Hadron Physics Collaboration, while Bedaque and DeTar, respectively, reviewed attempts to compute nuclear properties on the lattice and recent lattice results with light quarks at zero and nonzero temperature.

Each of the eleven parallel sessions was arranged and coordinated by a single convener. They covered a wider range of topics and presented a broader perspective. One session reported on recent developments in experiment and theory regarding the electromagnetic pion form factor, a topic that will be revisited in a GHP-organised session at the April APS meeting this year. Other sessions canvassed the physics of: charmonium systems; heavy-quark hadrons; exotics; nucleon resonances – theory and experiment; nucleon spin; electroweak probes; hadron beams; and cascades.

The conference closed with observations on the future of the field from the perspective of the NSF (Keister), the DOE (Tippens), Jefferson Lab (Cardman) and Brookhaven (Johnson).

The organizers are grateful to the students and staff, the speakers, and the participants, all of whom contributed to a successful conference.

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6 Membership

At the beginning of 2005, the GHP had 308 members. On 8 Jan. 2007 the number was 355. This is 15% growth over the last two years. The Executive believes that the lead-up to and successful conduct of GHP06 helped increase membership. GHP accounts for 0.77% of APS membership. We have roughly the same level of membership as the Topical Groups on *Few Body Systems*, *Plasma Astrophysics* and *Shock Compression of Condensed Matter*. Plainly, continued growth is nevertheless something for which to strive.

It is notable that GHP has 274 male members, of which 56 are Fellows of the APS, and 36 female members, of which 2 are Fellows. (NB. female/male = 13%. 45 members do not identify sex. Note, too, that the vast majority of the Fellows were elected before GHP came into being.)

For comparison DNP has 2519 members (f/m = 12%) and DPF, 3370 (f/m = 11%). In the last year, DNP has grown by 2.7% while DPF membership has remained roughly constant. Only 217 of DNP's members belong to GHP (increase of 6.4%) and 225 from DPF (increase of 5.6%). These fractions are an improvement on last year, but there are probably still many Hadron Physics researchers who are not involved with GHP.

Hence, if you are reading this newsletter but are not a member of GHP, *please join*. Current APS members can add units online through the APS secure server: http://www.aps.org/memb/unitapp.cfm.

On the other hand, if you are already a member of GHP, please discuss the merits of our Topical Group with your colleagues and encourage them to join. As noted above, we have had modest success with this in the past year.

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.

Membership is only $7. Of this, GHP receives $5 from the APS. (The remainder stays with the APS and covers the many services they provide.) With this support we can be an active force for Hadron Physics. The money can be used, for example, to assist with: the organization of meetings; the preparation of publications that support and promote the GHP's activities; and the participation in those fora that affect and decide the direction of basic research.

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7 Forthcoming Meetings

The GHP web site http://www.aps.org/units/ghp/ has a *Conferences* link – http://www.aps.org/units/ghp/meetings.cfm. This lists meetings that are likely to be of interest to GHP's membership. The Executive welcomes suggestions for postings.

The following meetings are currently listed for the coming year:

March, 07 ...

- Confinement: Connecting the light- and heavy-quark domains
  12-16 March, 2007, ECT*, Trento, Italy

May, 07 ...

- Light Cone 2007: Relativistic Hadronic and Nuclear Physics
  14-18 May, 2007, Ohio Center for Technology & Science, The Ohio State University, Columbus, OH
- Exclusive Reactions at High Momentum Transfer
  21-24 May, 2007, Jefferson Lab, Newport News, VA
- NuInt07 – Fifth International Workshop on Neutrino-Nucleus Interactions in the Few-GeV Region
  30 May – 3 June, 2007, Fermilab

June, 07 ...

- BARYONS07 – 11th International Conference on Baryons
  11-15 June, 2007, Seoul National University, Seoul, Korea

July, 07 ...

- NNPSS 07 – 2007 National Nuclear Physics Summer School
  8-21 July, 2007, Florida State University, Tallahassee, Fl

September, 07 ...

- NSTAR2007 – Workshop on the physics of excited nucleons
  5-8 September 2007 Bonn, Germany
- MENU07 – Eleventh International Conference on Meson-Nucleon Physics and the Structure of the Nucleon
  10-14 September, 2007, Institute for Nuclear Physics, Forschungszentrum Jülich, Germany
- EINN 2007 – 7th Research Conference on Electromagnetic Interactions with Nucleons and Nuclei
  10-15 September 2007, Milos island, Greece
- Erice School: Quarks in Hadrons and Nuclei
  16-24 September, 2007, Erice, Sicily, Italy

October, 07 ...

- HADRON 07 – International Conference on Hadron Spectroscopy
  8-13 October, 2007, Laboratori Nazionali di Frascati
- 2007 Meeting of the Division of Nuclear Physics
  10-13 October, 2007, Newport News, VA

February, 08 ...

- QM2008 – 20^{th} International Conference on Ultra-Relativistic Nucleus-Nucleus Collisions, **4-10 February, 2008**, Jaipur, Rajasthan, India.

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8 Long Range Plan

In a letter dated ***17 July, 2006***, the Department of Energy and National Science Foundation Nuclear Science Advisory Committee (NSAC) was requested to conduct a new study of the opportunities and priorities for nuclear physics research in the United States, and to recommend a long range plan that will provide a framework for coordinated advancement of the nation's nuclear science research programs over the next decade. The charge letter is available at http://www.er.doe.gov/np/nsac/docs/NSAC%20Charge_LRP.pdf.

The letter reminds NSAC that the Administration requires activities to be evaluated against established performance goals. It indicates that this long range plan process should gauge progress toward achieving the long-term goals for the nuclear physics program, which were identified in 2003, and that consideration be given to whether these goals should be revised. The 2003 measures can be reviewed at

http://www.er.doe.gov/measures/scprograms/np/np.html.

An interim report, containing the essential components of NSAC's recommendations, is requested by October, 2007. The final report is required by the end of calendar year 2007.

As part of this process the Division of Nuclear Physics organised a pair of Fri.-Sun. town meetings:

- Quantum Chromodynamics, which covered both "the Phases of QCD Matter" and "QCD and Hadron Physics" and took place at Rutgers University, January 12-14, 2007: www.physics.rutgers.edu/np/2007lrp-home.html

- Astrophysics, the Study of Nuclei, Neutrinos, Neutrons, and Fundamental Symmetries, which took place in Chicago, January 19-21, 2007: http://www-mep.phy.anl.gov/atta/dnp/

The web sites listed are now host to files that contain the presentations that were made.

GHP was represented at both meetings. DNP, however, did not require our assistance in planning. The Rutgers University Town Meetings were of particular importance to GHP's membership. They were organised by two committees (GHP members are written in italics):

HADRON PHYSICS
Simon Capstick (Florida State University), Lawrence S. Cardman (Jefferson Lab), Abhay L. Deshpande (SUNY Stony Brook), Xiangdong Ji (University of Maryland) – Co-Chair, Cynthia Keppel (Hampton University), *Curtis Meyer* (Carnegie-Mellon University), Zein-Eddine Meziani (Temple University) – Co-Chair, John Negele (MIT), Jen-Chieh Peng (Illinois).

PHASES OF QCD MATTER
Peter Jacobs (Lawrence Berkeley National Laboratory) – Co-Chair, Dima Kharzeev (BNL) *Berndt Mueller* (Duke University) – Co-Chair, Jamie Nagle (Colorado), Krishna Rajagopal (MIT), Steve Vigdor (Indiana).

These two meetings, running in parallel, each produced approximately five recommendations.

Those from the QCD and Hadron Physics section are available at http://www.physics.rutgers.edu/np/2007lrp-hadron-bullets.html. The Executive urges members of GHP to review and comment on these bullets. A link at the bottom of the page will allow you to EMail the organizers.

The main thrust of these recommendations is: run the existing programs, complete the planned upgrades, and invest in people and equipment. There is also a recommendation that a high luminosity Electron-Ion Collider (EIC) should be the highest priority of the QCD community for new construction after the JLab 12 GeV and RHIC II luminosity upgrades. This will recommendation will also appear in the list deriving from the "Phases" Town Meeting.

The final bullets from all town meetings will be reconciled in the coming months, so that a unified document for Nuclear Physics can be presented as a response to the Charge Letter.

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9 APS Convocation and Congressional Visits Day

This year the APS Unit Convocation was held on Saturday, Feb. 17, at the American Center for Physics in College Park, Maryland. The purpose of the Unit Convocation is to familiarize new executive officers from various APS units with the APS, and introduce them to staff from APS headquarters. The Convocation is a useful forum in which to learn about logistical issues such as planning unit meetings, increasing membership or handling finances. In addition, there are discussion sessions, e.g., focusing on how the APS can help foster interdisciplinary research, and how APS units can work more effectively with the APS Washington Office to advocate physics research and education. This year the Convocation was attended by Wally Melnitchouk and Winston Roberts.

On Friday, Feb. 16, prior to the Unit Convocation, the APS organized a Congressional Visits Day. This is arranged each year as part of the APS's ongoing work to inform congress about physics in the US. A briefing is held in the morning at the APS Washington D.C. offices, after which the participants attend meetings with Members of Congress that they have previously

arranged. This year, Wally Melnitchouk and Winston Roberts represented GHP at this event. Curtis Meyer had planned to participate but the APS suggested that a visit to his representatives would better be delayed until the Spring.

An summary of these events will appear in the next newsletter.

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10 State of the Laboratories

For this issue the Executive solicited and received input for this section from EBAC at JLab and PANDA at GSI, and we also include information on the 2007 National Nuclear Physics Summer School.

We would be pleased to receive input from GHP membership, in particular from people at labs with hadron physics programs who are willing to prepare input and clear it with their lab's leadership. The following contributions should serve as a template.

EBAC at JLab
(Communicated by T.-S. Harry Lee, ANL; EMail: lee@phy.anl.gov)

The Excited Baryon Analysis Center (EBAC) was established at JLab in January, 2006 to provide theoretical support to the excited baryon program. EBAC's program has two components. The first is to identify new baryon states and extract from the meson production data those observable parameters that characterise nucleon resonances. The second is to interpret the extracted N^* parameters.

To achieve these goals, a dynamical coupled-channel reaction model has been developed at EBAC and is being used to analyze the π, η, ω, and 2π production data. An extension of the investigation to include the strangeness production channels: $K\Lambda$ and $K\Sigma$, is also in progress. A complete analysis of nucleon resonances with mass below 2 GeV is required before the end of 2009 in order to meet a key performance milestone identified by the Office of Nuclear Physics of the US Department of Energy.

EBAC is collaborating with experimental groups to develop and/or improve the empirical amplitude analysis methods that are needed to process a very large amount of data. Collaborations with the theory groups at Jülich, Saclay and Florida State University have also been developed.

More information on EBAC can be found at http://ebac-theory.jlab.org.

PANDA at GSI
(Communicated by Ulrich Wiedner, Bochum; EMail: ulrich.wiedner@tsl.uu.se)

The PANDA collaboration plans to build a state-of-the-art general-purpose detector for strong interaction studies at the high-energy storage ring (HESR) at the upcoming international FAIR facility at the GSI site (Germany). The detector, placed as an internal detector inside the storage ring, is designed to take advantage of the extraordinary physics potential, which becomes available utilizing cooled antiproton beams. Previous antiproton experiments at LEAR and at Fermilab have demonstrated this and laid the groundwork for PANDA.

Spectroscopy has been a prime tool for physics in the last century and led the way to the development of quantum mechanics and the so-called Standard Model of physics. Perturbation theory within the Standard Model is very successful and hadron physics would be very uninteresting if that were all there was. However, our knowledge of the behavior of QCD

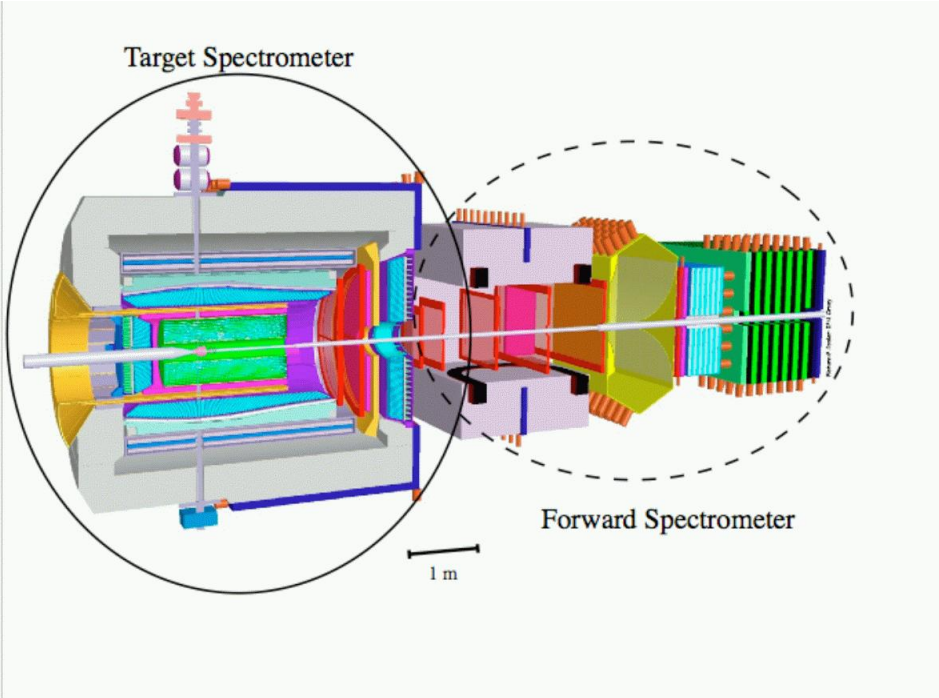
outside the perturbative domain is still rather primitive. Therefore, as in the past, we will probably learn a lot from spectroscopy experiments, both in the dynamics governing the interaction of fundamental particles and in the existence of new forms of matter. The latter could consist of: states involving gluonic degrees of freedom, like glueballs and hybrids; previously undiscovered charmonium states; and implanted hypernuclei in matter or mesons produced inside a dense nucleus. Until we can predict, confirm and explain those physical states of the theory we can hardly claim that we understand the strong interaction. Such an understanding might have far reaching implications in particle physics. It is, for example, quite possible that the weak interactions become strong at high energies and therefore field theories of the strong interaction may be relevant to the mechanism of electroweak symmetry breaking. In strong-interaction studies based on QCD we have the ideal laboratory to test our understanding of theory against experimental results.

However, it is obvious that significant progress over present understanding can only be made if the statistics and precision of the data and their analysis exceeds what has hitherto been achieved by several orders of magnitude. On one hand, the PANDA detector must be optimized keeping the above physics goals in mind but, on the other hand, be flexible enough to accommodate additional, newly arising physics topics, e.g. Drell-Yan and CP-violating processes. Because of its intrinsic ability to cover a broad variety of physics processes, the PANDA detector's potential for discoveries or dealing with additional physics topics is maximized.

Placing a detector inside a storage ring allows for an optimal use of precious antiprotons but puts challenges on the detector itself. Since the number of antiprotons is limited, the required high-luminosity can only be achieved by a properly attuned target. Triggering on decaying charm particles requires precise microvertex tracking close to the target or lepton identification, dependent on the final state. The proposed PANDA detector has an advanced particle identification system, which can pick out especially interesting final states. Charged particle tracking together with a high-resolution electromagnetic calorimeter are mandatory for spectroscopy experiments. The almost full coverage of the solid angle in PANDA is achieved by a combination of a target spectrometer with a forward spectrometer. This complex detector arrangement is to ensure the measurement of many parameters and signatures. This then gives a robust and redundant physics reconstruction and is considered especially important in a high-luminosity environment because it allows internal cross checks. At the same time, the detector must withstand large radiation dosage from hadrons emitted by the spallation process when using nuclear targets. These spallation products include neutrons down to thermal energies, which contribute most.

The planned PANDA detector, depicited in the figure on page 13, is subdivided into two parts: i) a target spectrometer with a solenoid magnet surrounding the interaction region and ii) a forward spectrometer with a large-acceptance dipole magnet. The forward direction dipole magnet also bends the HESR beam, allowing for an electromagnetic calorimeter to be placed at 0°. Only this combination of two spectrometers allows full angular coverage and takes into account the wide range of energies. At the same time it still has sufficient flexibility to enable individual components to be exchanged or added for specific experiments, e.g. those with hypernuclei or with the special needs of CP violation studies.

The internal target, which could be a pellet target of frozen hydrogen droplets, a gas jet target or a wire used as nuclear target, is surrounded by Si-pixel detectors in the vertex region. The main vertex tracking further out is done with straw chambers or a high-rate TPC and mini drift chambers. Ring imaging Cherenkov counters will provide the particle identification. The proposed electromagnetic calorimeter is an arrangement of $PbWO_4$ crystals, read out by avalanche photodiodes. In particular the required energy resolution of 1-2% for low-energy



The PANDA detector.

photons is clearly beyond what had been achieved so far, e.g. for the LHC experiments. However, R&D studies within PANDA show that the goal is achievable. The superconducting solenoid provides a field of 2 T. Particles emitted with polar angles below 10° in the horizontal and 5° in the vertical direction are measured with the help of a 1 m gap dipole in the forward spectrometer. Mini drift chambers will be located before and behind the dipole for tracking. Particle identification in the forward spectrometer is obtained by a TOF-Stop detector and a possible dual-radiator RICH detector. Behind this there is a $3\,m^2$ electromagnetic calorimeter and an hadronic calorimeter followed by a muon detection system. In order to handle the 10^7 annihilations/s a sophisticated DAQ system allowing hierarchical triggers is implemented.

The PANDA collaboration itself consists of approximately 400 physicists from 50 institutions worldwide. PANDA plans to be online and ready for physics in the years 2013/14 depending on the overall construction progress of FAIR. More information about PANDA is available is http://www.gsi.de/panda.

2007 National Nuclear Physics Summer School

(Communicated by Winston Roberts, FSU; EMail: wroberts@fsu.edu)

The 2007 National Nuclear Physics Summer School will take place on the campus of Florida State University, Tallahassee, Fl, from July 8th to July 21st, 2007. The school is sponsored by: the National Science Foundation; the Institute for Nuclear Theory; Jefferson Science Associates, LLC; and Florida State University. The planned lectures are:

- Physics of Nuclei: Ian Thompson, Lawrence Livermore National Laboratory
- The Hadron Spectrum: Jozef Dudek, Thomas Jefferson National Accelerator Facility and Old Dominion University
- Nuclear Astrophysics: Jeff Blackmon, Oak Ridge National Laboratory
- Neutrino Physics: Stuart Freedman, LBL

- RHIC Physics: Peter Steinberg, Brookhaven National Laboratory
- Fundamental Neutron Physics: Geoff Greene, Oak Ridge National Laboratory

In addition to the lectures, there will be a number of special seminars:

- Neutrino Physics: The High Energy Perspective: Boris Kayser, Fermi National Accelerator Laboratory
- Nuclei as Mesoscopic Systems: Alexander Volya, Florida State University
- The Physics of the 12 GeV Upgrade at JLAB: Christian Weiss, Thomas Jefferson National Accelerator Facility
- Nuclear Exotica: Ingo Wiedenhover, Florida State University
- Effective Field Theories Applied to Nuclear Systems: Achim Schwenk, TRIUMF
- RHIC Spin: Abhay Deshpande, SUNY Stony Brook and RBRC
- Supernova Theory and Nuclear Astrophysics: Adam Burrows, University of Arizona
- Proposal Preparation Workshop: Alan Nathan, University of Illinois.

The school is aimed at senior graduate students and beginning post-doctoral researchers. Further information can be found at http://www.physics.fsu.edu/nnpss. Applications are due by Friday, April 20th, 2007.

This GHP Newsletter was edited by Craig Roberts for the Executive Committee.