National Nuclear Physics Summer School 2011

Hosted by the Triangle Universities Nuclear Laboratory
At the University of North Carolina at Chapel Hill

June 19 – July 2, 2011

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Date: June 19 – July 2, 2011

Location: The University of North Carolina at Chapel Hill, Chapel Hill, NC

Organizers: Calvin Howell (Duke University, Durham, NC), Paul Huffman (NC State University, Raleigh, NC) and John Wilkerson (University of NC, Chapel Hill, NC)

Introduction

The 2011 National Nuclear Physics Summer School (NNPSS) was hosted by the Triangle Universities Nuclear Laboratory (TUNL) on the campus of the University of North Carolina at Chapel Hill. There were sixty-two participants, six lecturers and six seminar speakers. In addition, local experimental nuclear physics faculty participated from TUNL, which is a Department of Energy Center of Excellence that is a research consortium of three major universities in the Research Triangle Area in North Carolina: Duke University in Durham, North Carolina State University in Raleigh and the University of North Carolina at Chapel Hill. Nuclear theorists from the same three universities also were involved in the program.

Location

The Summer School was held on the campus of the University of North Carolina at Chapel Hill (UNC-CH). The lectures and seminars were given in a large modern lecture hall classroom with a seating capacity of about 180. Also, three small classrooms (seating capacity of about 40) were utilized for small group discussions each afternoon.

The students were housed in apartment style dormitory rooms. Each student had a private room and shared a bath room with one other student. There were four bedrooms, two bathrooms, a small kitchenette and living room in each apartment. The dorm rooms were air conditioned with fast internet connections. The speakers were housed in a hotel that was directly adjacent to campus. The students and speakers took their meals together with the goal of encouraging interactions outside the classroom.

Description of the School and schedule

Six topics were covered in the Summer School. The topics are chosen to overlap strongly with the intellectual frontiers of the field as described in the most recent DOE/NSF NSAC Long-range Plan. Topics and speakers were:

- **Nuclear structure:**
    - Lecturer: Scott Bogner, Michigan State University
    - Seminar speaker: Kate Jones, The University of Tennessee

- **Nuclear Astrophysics:**
    - Lecturer: Christian Iliadis, The University of North Carolina at Chapel Hill
    - Seminar speaker: Gail McLaughlin, North Carolina State University

- **Exploring Hot Dense Matter at RHIC and LHC:**
    - Lecturer: Peter Jacobs, Lawrence Berkeley National Lab
    - Seminar: Olga Evdokimov, The University of Illinois at Chicago

- **Hadron Structure:**
    - Lecturer: Naomi Makins, The University of Illinois at Urbana-Champaign
    - Seminar: Assumpta Parreno, The University of Barcelona

- **Fundamental Symmetries:**
    - Lecturer: Robert Tribble, Texas A&M University
    - Seminar speaker: Jeffrey Nico, National Institute of Standards and Technology

- **Neutrinos:**
    - Lecturer: Boris Kayser, Fermi National Accelerator Laboratory
    - Seminar speaker: Joseph Formaggio, Massachusetts Institute of Technology

The school was organized with two lectures presented each morning and one lecture following lunch. The exact ordering of lectures was ultimately driven by the availability of the speakers. Appendix 1 shows the detailed schedule. Lecture materials were collected and posted on-line.

To stimulate discussions during and immediately following lectures, speakers provided the students with a list of "homework" questions prior to or during their presentations. In the late afternoon session the students were divided into small groups of 4-5 people. The students were divided up so that each group contained a "mix" of students, representing the mix of fields and research topics. These working sessions were held in the smaller class rooms where the students could sit together and work on the homework. During these working sessions the lecturers and local faculty circulated through the groups listening in to their discussions and answering or asking questions. After about an hour, the school would reconvene in the large lecture hall, and

the student groups would present at the blackboard their answers to the questions. The lecturers or seminar speakers would comment or help as needed. The students and lecturers commented on the success of these sessions, and the homework questions were both interesting and challenging.

On the first Friday of the school, a poster session was held. The students had been asked in advance to prepare posters and nearly all of them had posters at the session. For this session the students were organized into eight groups and there were four separate viewing periods. This way the students were able to visit the majority of the posters. A number of the local faculty also participated in this session.

Participant Information

One hundred fourteen students applied to attend the 2011 National Nuclear Physics Summer School. Applications were reviewed by the organizers. Preference was given to students that had never attended a previous NNPSS and to students further along in their graduate or postgraduate careers. A consideration was also given to balance the total number of students from the various research areas.

Sixty-four students were accepted and registered to attend the 2011 NNPSS. Two students withdrew from the program during the week before the summer school began. At this point, we were unable to amend our contracts to remove these students.

Students from UNC, Duke and NCSU were considered local participants for housing purposes and commuted daily. These students were provided with parking and lunch daily, and were included as non-local participants for outings. Min Huang (Duke University) was not considered to be a local participant as she is assigned to a non-local work location.
A demographics summary is provided in Table 1. In terms of nuclear physics research fields that were represented, the numbers reasonably followed the lecture topics, with about 1/6 of the students per topic.

Table 1 Demographics

24.2% Female
75.8% Male
8% International
92% National
3% - UNC students
13% - Duke and NCSU students
84% - Non-local students

Participant List

Last name	First Name	Institution
Abusara	Hazem	Mississippi State University
Adhikari	Krishna	Old Dominion University
Ashley	Rachel	Simon Fraser University
Ayangeakaa	Akaa Daniel	University of Notre Dame, IN
Behling	Spencer	Texas A&M University
Betancourt	Michael	MIT
Bojazi	Michael	Clemson University
Brown	Zachary	William and Mary
Burgos	Juan	NSCL-MSU
Bzdak	Adam	Lawrence Berkeley National Laboratory
Chen	Guangyao	Texas A&M University
Chen	Lizhu	Huazhong Normal University/BNL
Coleman-Smith	Christopher	Duke Physics
Crider	Benjamin	University of Kentucky
Cui	Xiangli	Brookhaven National Laboratory
da SIlva Schneider	Andre	Indiana University
Eakins	Benjamin	Florida State University
Fattoyev	Farrooh	The Florida State University
Friend	Megan	Carnegie Mellon University
Gan	Kangfei	The George Washington University
Gillis	Chad	Indiana University
He	Daheng	University of Kentucky
Hinrichs	Paul	University of Wisconsin-Madison
Hossbach	Todd	PNNL/UChicago
Huang	Min	Duke University
Jigmeddorj	Badamsambuu	University of Guelph
Karcz	Maciej	Indiana University
Kendellen	David	North Carolina State University
Kulikov	Vasily	Moscow State University
Laskaris	Georgios	Duke University
Li	Anyi	Duke University
Li	Ziyue	North Carolina State University
Magee	Joshua	The College of William & Mary
Marji	Ehab	University of Idaho
Martin	Elise	University of Kentucky
Mastropas	Ekaterina	The College of William & Mary

Moody	Cristina	Purdue
Mumpower	Matthew	NCSU
Musgrave	Matthew	University of Tennessee
Patel	Darshana	University of Notre Dame
Patel	Laura	Georgia State University
Patton	Kelly	North Carolina State University
Perez-Obiol	Axel	Universitat de Barcelona
Pettus	Walter	University of Wisconsin-Madison
Posik	Matthew	Temple University
Qiu	Zhi	Ohio State University
Reilly	Bethany	University of Wisconsin-Madison
Roscher	Dietrich	Michigan State University, NSCL
Ross	Timothy	University of Richmond
Sagert	Irina	Michigan State University, East Lansing
Saini	Mukesh	Florida state university
Schillaci	Cory	UC Berkeley
Shabestari	Mitra	MSU
Shafer	Thomas	UNC Chapel Hill
Shanshan	Cao	Duke University
Shen	Chun	The Ohio State University
Shidling	Praveen	Cyclotron Institute, Texas A&M University
Tompkins	Jeromy	UNC-Chapel Hill
Voskresenskaya	Maria	GSI Helmholtzzentrum Schwerionenforschung GmbH
Wolff	Zack	Purdue University
Xu	Wenqin	University of California Los Angeles
Zhang	Xilin	Indiana University--Bloomington

Social Activities

A number of activities were organized to foster interactions among students and speakers in a social setting. The school opened with a dinner on Sunday evening where the participants were able to get acquainted and had opportunity to meet the lecturers and mingle with local faculty and students. On Saturday, July 25th, the participants were taken on a tour of the TUNL research facilities. After the tour of the research facilities, the group enjoyed dinner and an evening Durham Bulls baseball game. On Sunday, July 26th, the participants were taken to Jordan Lake State Recreation Area. The participants enjoyed volleyball, tossing a football, swimming and kayaking. Lunch was catered by a local barbecue restaurant. Various TUNL faculty and graduate students attended both of these events. The school concluded with a farewell luncheon at the Carolina Inn.

The University of North Carolina at Chapel Hill's Institute for Neutrino Science and Astrophysics provided administrative support for the NNPSS.

Appendix 1
NNPSS 2011 Schedule

June 20 - 24	**Sunday/19**	**Monday/20**	**Tuesday/21**	**Wednesday/22**	**Thursday/23**	**Friday/24**	**Saturday/25**
7:30 - 8:30		*Breakfast*	*Breakfast*	*Breakfast*	*Breakfast*	*Breakfast*	*Breakfast*
9:00 - 10:15		Jacobs (HDM)	Jacobs (HDM)	Jacobs (HDM)	Evdokimov (HDM)	Jacobs (HDM)	
10:15 - 10:45		Break	Break	Break	Break	Break	
10:45 - noon		Evdokimov (HDM)	Jones (NS)	Makins (HS)	Makins (HS)	Makins (HS)	
noon - 14:00*		Lunch	Lunch	Lunch	Lunch	Lunch	Lunch
14:00 - 15:15		Open	Discussion	McLaughlin (NA)	Discussion	*Poster*	
15:15 - 15:45		Break	Break	Break	Break	Break	
15:45 - 17:00		Discussion	open	Discussion	open	*Session*	TUNL Tour
18:15 - 19:15*	*Welcome Dinner*	Dinner	Dinner	Dinner	Dinner	Dinner	*Durham Bulls game*

June 27 - July 1	**Sunday/26**	**Monday/27**	**Tuesday/28**	**Wednesday/29**	**Thursday/30**	**Friday/1**	**Saturday/2**
7:30 - 8:30	*Breakfast*	*Breakfast*	*Breakfast*	*Breakfast*	*Breakfast*	*Breakfast*	
9:00 - 10:15		Bogner (NS)	Bogner (NS)	Bogner (NS)	Tribble (FS)	Nico (FS)	
10:15 - 10:45		Break	Break	Break	Break	Break	
10:45 - noon	*Cookout Jordan Lake*	Kayser (nu)	Tribble (FS)	Kayser (nu)	Kayser (nu)	Tribble (FS)	
noon - 14:00*		Lunch	Lunch	Lunch	Lunch	*Farewell Lunch*	
14:00 - 15:15		Discussion	Iliadis (NA)	Parreno (HS)	Iliadis (NA)	Iliadis (NA)	
15:15 - 15:45		Break	Break	Break	Break	Break	
15:45 - 17:00		open	Discussion	Discussion	Discussion	Discussion	
18:15 - 19:15*	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	

*Lunch in the dining hall will be from 12:30 - 1:30pm
*Dinner at the Durham Bulls Game begins at 6:00pm