

# *Closing Remarks @ Spin 2018*



*Haiyan Gao*

*Duke University and Duke Kunshan University*



## *Not a summary of Spin2018 program*

- Thanks to all conveners for excellent highlight talks
- Thanks to all plenary talk speakers for their excellent talks
- A few remarks
  - Personal reflection
  - Spin Physics Symposium: global nature, impact and diversity in topics
  - Unveiling Spin 2020

D1



**SPIN 2018**  
 9-14 September 2018 University of Ferrara

**The Wonder of Spin Dynamics  
 in  
 Quantum Chromodynamics**

Jianwei Qiu  
 Theory Center, Jefferson Lab



**Fifty Years of Polarized Targets**

A personal Memoir  
 D. G. Grubb  
 University of Virginia

**Electric Dipole Moment Searches using Storage Rings**

Frank Rathmann  
 (JEDI collaboration)  
 Forschungszentrum Jülich  
 10.09.2018

D2

**Nuclear Spin Physics  
 via Polarization Measurements**

Tomotsugu Wakasa  
 Department of Physics, Kyushu University

**Experimental overview of Transverse  
 Momentum Distributions and  
 Momentum Effects**

*Spin 2018*  
**INTERNATIONAL SPIN SYMPOSIUM  
 FERRARA - ITALY**

University of Trieste and INFN

**Status and Perspectives of the NICA Project**

A.D. Kovalenko, V.D. Kekekidze, R. Lednicky, V.A. Matveev,  
 I.N. Meshkov, A.S. Sorin, G.V. Trubnikov, R. Tsenov  
 Joint Institute for Nuclear Research, Dubna

**Final Results of the Qweak Experiment**

A search for new PV physics at the TeV scale  
 by measuring the proton's weak charge ( $Q_p$ )

Greg Smith  
 (Jefferson Lab)  
 for the  
 Qweak  
 Collaboration

**Hyperpolarizing  
<sup>13</sup>C spins by DNP for  
 MRI applications**

Arnaud Comtet  
 GE Healthcare

D3

**Nucleon Femtography  
 from Exclusive Reactions**

Simonetta Liuti  
 (University of Virginia)

**Internal gas target experiments at the LHC**

V. Coraschi<sup>1</sup>, G. Ciullo<sup>1</sup>, P. Di Nezza<sup>2</sup>, P. Lenzi<sup>3</sup>, L. Pappalardo<sup>1</sup>, E. Steffens<sup>4</sup>

<sup>1</sup>INFN, <sup>2</sup>INFN Laboratori Nazionali di Frascati, <sup>3</sup>University of Bergen

**Overview and status of the muon g-2  
 experiment at Fermilab**

David Hertzog, on behalf of the E989 Collaboration  
 University of Washington  
 January 12, 2018

**Self Polarization in Storage Rings**

Contents

- Theoretical discovery of radiative polarization.
- Very first evidence of beam polarization (at low energy).
- Later measurements at higher energy.
- HERA collider.
- Summary.

Eliana GIANFELICE (Fermilab)  
 SPIN 2018, FERRARA

*Spin 2018*  
**23<sup>rd</sup> INTERNATIONAL SPIN SYMPOSIUM  
 FERRARA - ITALY**

10 - 14  
 SEPTEMBER  
 2018

30 years of **hermes**  
 exploiting self-polarization in storage rings at HERA

D4

**Status and Perspectives  
 of a US-based  
 Electron-Ion Collider  
 (EIC)**

Bernad Surrow  
 TEMPLE  
 University of Kentucky

**Spin Phenomena in Jets**

Renee Fatemi  
 University of Kentucky

**Spin Physics with Photon Beams**

Paolo Pedroni  
 INFN-Sezione di Pavia, Italy  
 For the A2@MAMI collaboration  
 (Mainz-Germany)

D5

**Lattice QCD calculations of the quark  
 and gluon contributions to the  
 proton spin**

Rajan Gupta  
 (Los Alamos National Lab)

**Quantum technologies: manipulating  
 individual spins**

Tommaso Calarco  
 (University of Cologne and Jülich  
 Research Centre)

# University of Ferrara, one of the oldest in Italy (est. 1391)



# **Duke Kunshan University, a global new university in China among youngest in the world (est. 2014)**



**Three Italian students are among the inaugural class**

# Spin 2018 plenary sessions held in the theater “Teatro Nuovo”



# DKU inaugural CLASS 2022 Opening Convocation 2018, August 14, 2018



Haiyan Gao

# Another common feature is water



**Spin Physics Symposium has been  
global**

**Spin symposium series has been taking place in 9 countries so far;  
the two newest countries added: Italy (2004), China (2014)**

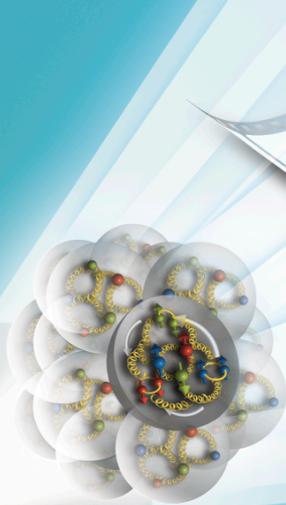


**More Global and new countries are invited to  
join the spin physics symposium family**

**Spin Physics Symposium has been  
impactful**

# ISPC at Spin 2014, Beijing, China





## Electron Ion Collider: The Next QCD Frontier

Understanding the glue  
that binds us all

EIC: next frontier for  
strong interaction

### Nucleon Structure:

- spin of nucleon
- mass of nucleon
- role of gluons
- confinement
- exotic states
- ...

CERN: LHeC

USA: eRHIC, JLEIC

China: EicC

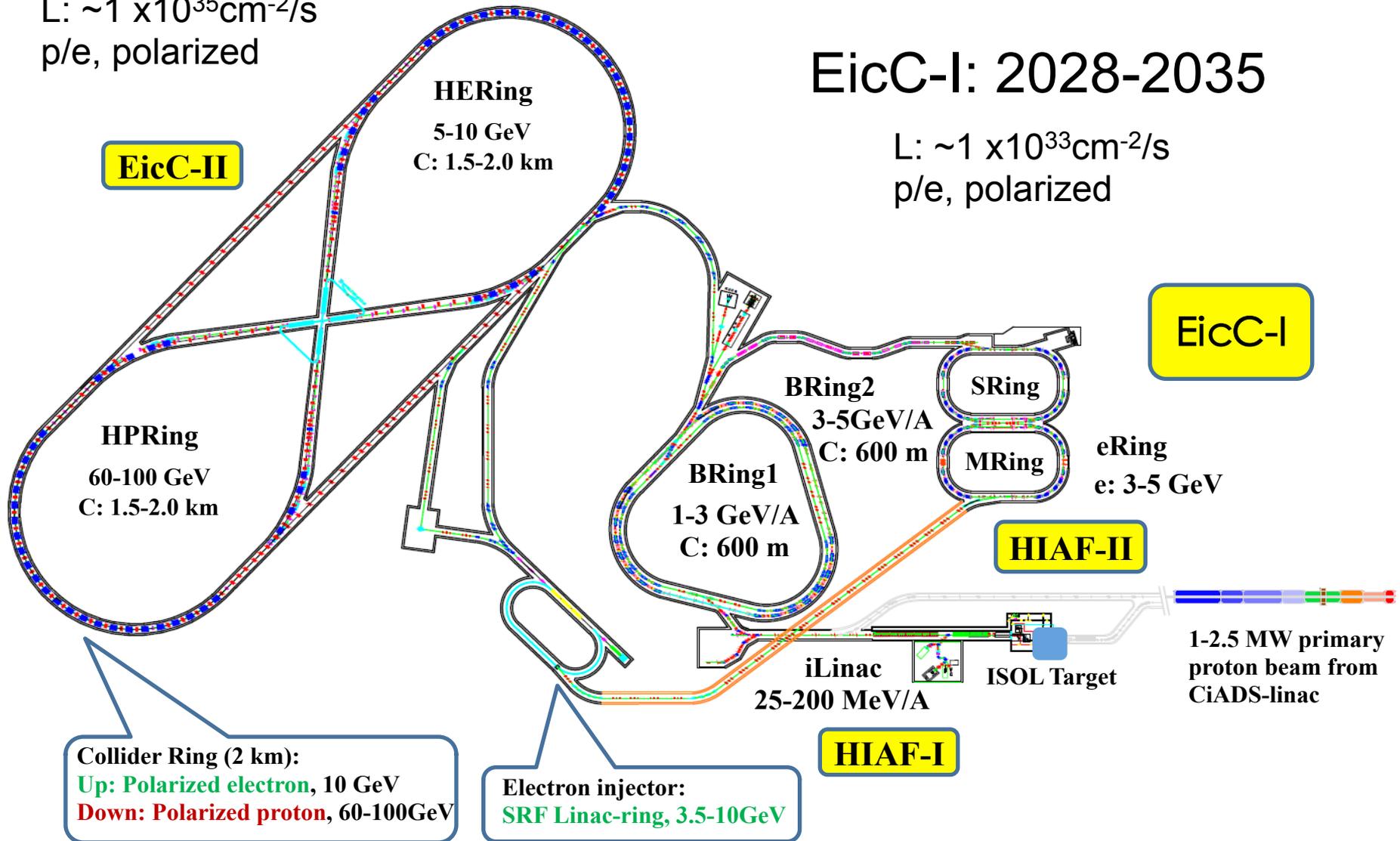
*Bernd Surrow's talk*

# EicC Conceptual Design

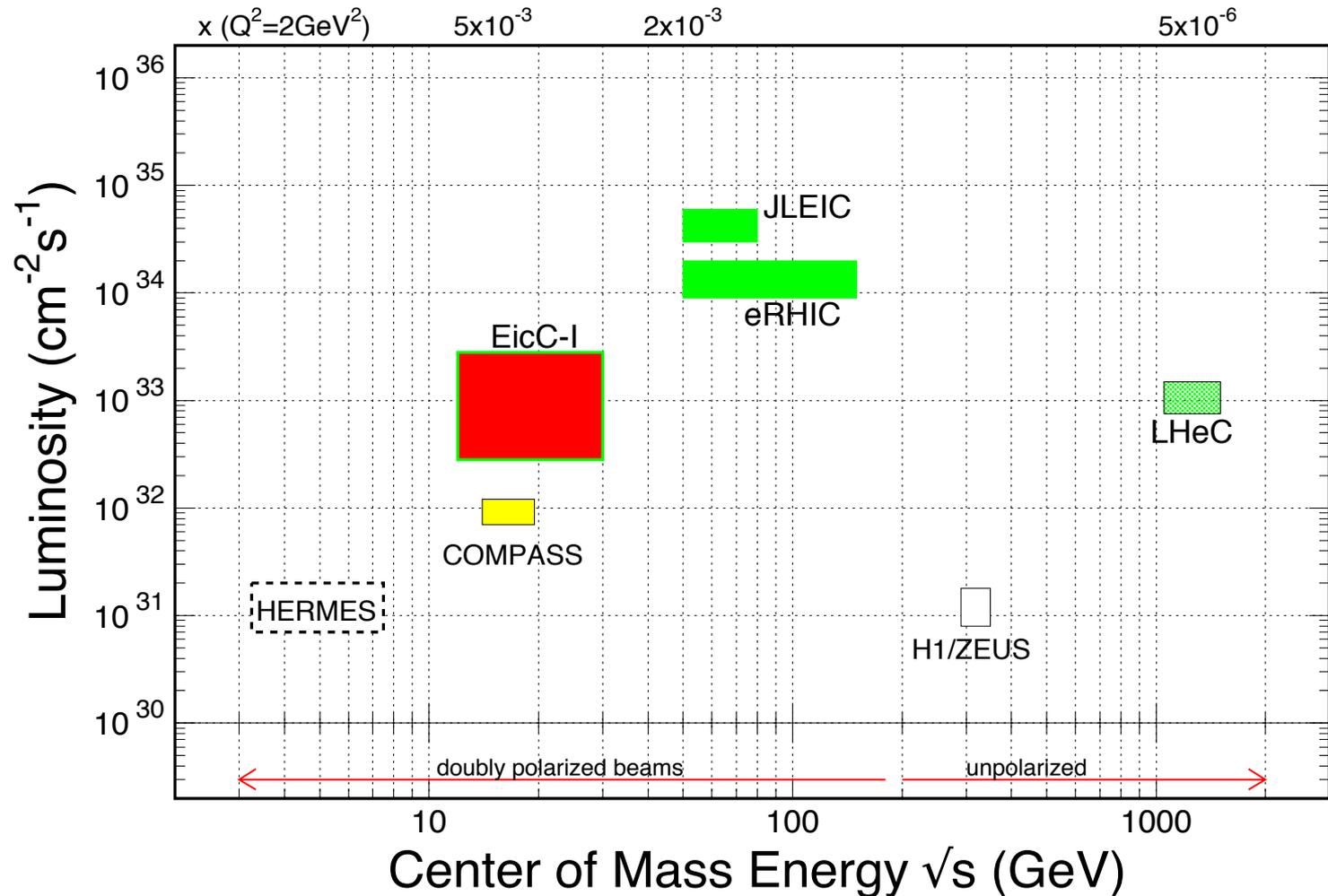
L:  $\sim 1 \times 10^{35} \text{cm}^{-2}/\text{s}$   
p/e, polarized

## EicC-I: 2028-2035

L:  $\sim 1 \times 10^{33} \text{cm}^{-2}/\text{s}$   
p/e, polarized



# Designed Energy and Luminosity



EicC-I: will be constructed at  $\sqrt{s} \sim 15\text{GeV}$  region

- 1) Focus on nuclear physics problems
- 2) B-quark hadron production

**Spin Physics Symposium has been  
diverse in spin related topics**

# *Spin Milestones and Proton Spin Puzzle*

- Spin Milestones: (Nature)

- 1896: Zeeman effect (milestone 1)
- 1922: Stern-Gerlach experiment (2)
- 1925: Spinning electron (Uhlenbeck/Goudsmit)(3)
- 1928: Dirac equation (4)
- Quantum magnetism (5)
- 1932: Isospin(6)
- 1935: Proton anomalous magnetic moment
- 1940: Spin–statistics connection(7)
- 1946: Nuclear magnetic resonance (NMR)(8)
- 1971: Supersymmetry(13)
- 1973: Magnetic resonance imaging(15)
- **1980s: “Proton spin crisis” (now puzzle)**
- 1990: Functional MRI (19)
- 1997: Semiconductor spintronics (23)
- 2000s: “New breakthrough in spin physics”?



**Pauli and Bohr watch a spinning top**

**Proton spin taken for granted for coming from the spin of the quarks!!**

**topological insulator, quantum anomalous Hall effect, etc..**

# More diverse spin related topics at recent spin symposia

- Spin 2018: Spin and Cosmology; Quantum Technologies: manipulating individual spins; Hyperpolarizing  $^{13}\text{C}$  spins by DNP for MRI applications; Applications to other fields
- Spin 2014: Medical Imaging with Highly Spin Polarized Molecules; public lecture on Quantum Anomalous Hall Effect and Information Technology; parallel sessions on spins in condensed matter, quantum information and computation
- Spins are important in all areas of physics - more diverse spin related topics and applications for spin symposium are desirable

**Unveiling the 24<sup>th</sup> Spin Physics  
Symposium – Spin 2020**

# ISPC at Spin 2018, Ferrara, Italy



Thank you for your participation of SPIN2018 at Ferrara  
Welcome all to SPIN2020 hosted by RIKEN in Matsue

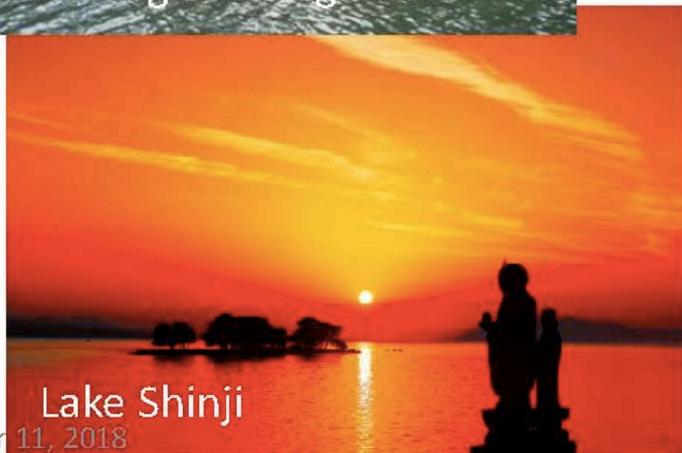
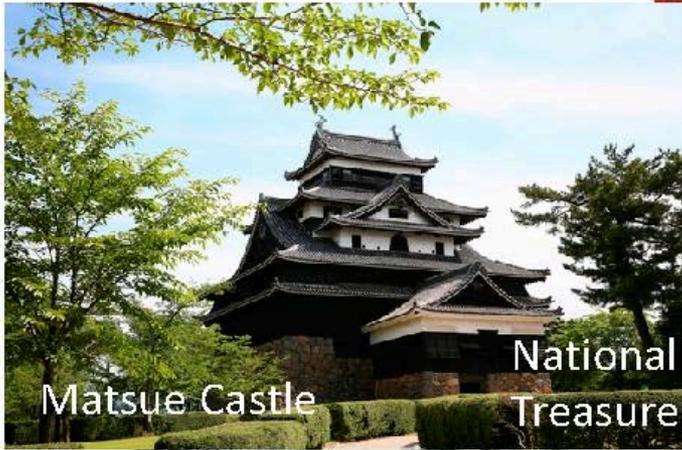


# Where is Matsue

- Famous and interesting area for 2,000 years of Japanese history from creation myth era to present day
- Two domestic airports near Matsue city, Izumo airport and Yonago airport
- About 30 to 45 minutes from both airports to Matsue city by airport shuttle bus
- Connected with Haneda international airport in Tokyo by more than 10 daily flights



# Sightseeing spots



# 2017 International Workshop on Polarized Sources, Targets, and Polarimetry

Oct 16 - 20, 2017

KAIST Munji Campus, Daejeon, Republic of Korea

ibs 기초과학연구원  
Institute for Basic Science

## ❖ TOPICS:

- **Polarized Solid Target**
- **Polarized Gas Target**
- **Polarized Electron Sources**
- **Polarized Ion Sources**
- **Proton Polarimetry**
- **Electron Polarimetry**
- **Application of Spin**
- **New Initiatives**

## Local Organization Committee

Seongtae Park *CAPP/IBS*

Jihoon Choi *CAPP/IBS*

Myeongjae Lee *CAPP/IBS*

Selcuk Haciomeroglu *CAPP/IBS*

Soohyung Lee *CAPP/IBS*

Yannis K Semertzidis *CAPP/IBS, KAIST*

Youngim Kim *CAPP/IBS*

## International Spin Physics Committee

H Gao *Duke* R Milner *MIT* E Aschenauer *ML* K Aulenbacher *Mainz*

A Belov *INR Moscow* H En'yo *RIKEN* P Lenisa *Ferrara* B-Q Ma *Peking*

N Makins *Illinois* A Martin *Trieste* A Milstein *Novosibirsk* M Poelker *JLab*

N Saito *KEK* E Steffens *Erlangen* H Stroehrer *Juelich* O Teryaev *Dubna*

W Vogelsang *Tubingen* F Bradamante *Trieste* E D Courant *BNL*

D G Crabb *Virginia* A V Efremov *JINR* G Fidecaro *CERN* W Haeberli *Wisconsin*

A D Krisch *Michigan* A Masaike *Kyoto* C Y Prescott *SLAC* T Roser *BNL*

V Soergel *Heidelberg* W T H van Oers *Manitoba*

The Workshop on Polarized Sources, Targets and Polarimetry has been a tradition for more than 20 years, moving between Europe, USA and Asia. The 17th International Workshop on Polarized Sources, Targets and Polarimetry (PSTP 2017) will take place at the Korea Advanced Institute of Science and Technology (KAIST), South Korea. The workshop addresses the physics and technological challenges related to polarized gas/solid targets, polarized electron/positron/ion/neutron sources, polarimetry and their applications.



Official Website: <http://pstp2017.ibs.re.kr>

Official Email: [pstp2017@ibs.re.kr](mailto:pstp2017@ibs.re.kr)

KAIST

# ORNL Proposal for PSTP 2019, approved by ISPC

## Knoxville TN

- Located in Eastern Tennessee, near the Smoky Mountains
- Home to the University of Tennessee
- Serviced by Tyson McGee Airport (TYS)
  - All major American carriers
  - 20 minutes from downtown Knoxville, 25 minutes from ONRL
- Many options for accommodations and venues
  - Many meeting spaces of different sizes available
  - University of Tennessee meeting spaces are a possibility
  - On site at ORNL is also an option, although Knoxville would be preferred



# XVII Workshop on High Energy Spin Physics

## *DSPIN-17*

Dubna, Russia, September 10 - 15, 2017

Starts 1981

by L.I. Lapidus

Possibility to participate of physicists from the former USSR was important motivation. Distant trips are complicated by financial (earlier also by political and bureaucratic) reason.

110 participants

50 invited talks (40-30')

40 original talks (20').

3 parallel sections.



JINR - 64, Russia - 22 ,  
Czech Republic - 4 ,  
Germany – 3, USA - 3 ,  
Belarus - 3, Poland - 2,  
Italy - 4, Slovakia - 4,  
Armenia, Bulgaria,  
Estonia, Netherlands and  
UK - 1



# International Workshop on Spin Physics at NICA (SPIN-Praha-2018)



9-13 July 2018  
Charles University, Prague  
Europe/Prague timezone

## Overview

General Information

Program Advisory  
Committee

Organizing Committee

List of registrants

Scientific Programme

Timetable

Accommodation

Transportation

Registration Form

Fee

Visa Application

Contacts

## OVERVIEW



This International Workshop on Spin Physics Experiments at NICA (SPIN-Praha-2018) is the next in the series of meetings on problems of symmetries and polarization phenomena in Particle and Nuclear Physics and Astrophysics related to the particles' spin. They have begun with the first meeting of this series at the Joint Institute for Nuclear Research, Dubna, in 1975, and continued on a regular basis from 1976 on in Czech Republic. Links to the Web sites of the previous meetings can be found at <http://spd.jinr.ru/doku.php?id=conferences>.

Prague spin physics meetings aim at:

**Thank you all and see you at Spin 2020 in Matsue, Japan**



**Special thanks to Paolo Lenisa, LOC, Program committee, conveners, all speakers, poster presenters, SPIN2018 participants, and ISPC members**