“Advanced Studies Institute on Symmetries and Spin”

SPIN-Praha-2013

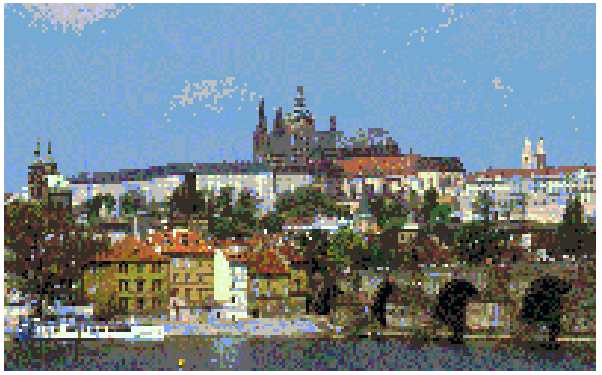
Miroslav Finger

Charles University, Faculty of Mathematics and Physics, Prague

Advanced Studies Institute on Symmetries and Spin

SPIN-Praha-2013

Tribute to the memory of B.S.Neganov



Prague, Czech Republic

July 7 – 13, 2013

Charles University, Faculty of Mathematics and Physics,
V Holesovickach 2,

180 00 Prague 8, Czech Republic

ADVANCED STUDIES INSTITUTE -- SYMMETRIES AND SPIN

SPIN-Praha-2013

- **Was 29th in the series of Prague meetings on Spin Research Programme**
- **organized with the support of**

- **International Committee for Spin Physics Symposia**
- **Joint Institute for Nuclear Research, Dubna, Russia**
- **Charles University, Prague**
- **Czech Technical University, Prague**
- **Institute of Physics, Academy of Sciences of Czech Republic, Prague**
- **Institute of Scientific Instruments, Academy of Sciences of Czech Republic, Brno**
- **University of Florida, Gainesville**

- **hosted by**

- **Charles University in Prague, Faculty of Mathematics and Physics**
-

SPIN-Praha-2013
was the 29th meeting in the series

- **the first meeting** of this series at JINR Dubna, **in 1975**
- and continued after that **from 1976 on regular basis at Czech Republic.**

- **Prague spin physics meetings cover topics related to symmetry and polarization phenomena in particle and nuclear physics and astrophysics.**

ADVANCED STUDIES INSTITUTE -- SYMMETRIES AND SPIN
SPIN-Praha-2013
Scope

- to take the broadest possible view of the discipline by inviting distinguished speakers both theoreticians and experimentalists from different collaborations aiming at the research of symmetry phenomena in various physics disciplines;
- to promote contacts among researchers with different background of physics to review and discuss present status and perspectives of their research;
- to help to form new collaborations;
- to help young researchers and students to take active part in the respective international research programmes.

ADVANCED STUDIES INSTITUTE SYMMETRIES AND SPIN

SPIN-Praha-2013

- **The host**

- **Charles University in Prague**
- **Faculty of Mathematics and Physics**

Participants

SPIN-Praha-2013 July 7 - 13, 2013

1.	Czech Republic	42
2.	JINR	38
3.	Germany	6
4.	Italy	6
5.	Japan	6
6.	Russia	6
7.	USA	4
8.	CERN	3
9.	Poland	2
10.	India	1
11.	South Africa	1
	Total	**110**

Scientific Programme

SPIN-Praha-2013 July 7 – 13, 2013

Sessions

Introductory	**3**		
Overview	**25**		
Dedicated	**25**	**Students**	**20**
Total oral presentations	**73**	**40 hours**	

Scientific Programme

SPIN-Praha-2013 July 7 - 13, 2013

General	**5**	**Finger, Baumruk, Skrbek, Mach, Krisch**
LHC		
ATLAS	**4**	**Grosse-Knetter, Kiryunin, Malyukov, Sanchez**
ALICE	**2**	**Bielcikova , Bufalino**
LHCb	**2**	**Ukleja, Anderlini**
FAIR	**1**	**Nicmorus**
FAIR/CBM	**1**	**Heuser**
FAIR/PANDA	**1**	**Maggiora**
RHIC/PHENIX	**1**	**Fields**
NICA	**14**	**Pesekhonov, Kovalenko, Kondratenko, Filatov, Shatunov, Butenko, Fimuskin, Kurilkin, Murin, Merkin, Akunzhianovm , Mashcheryakov, Savin, Nagaytsev**
NICA/SPD	**7**	**Savin, Nagaytsev, Gusov, Shimanski, Rossiyskaya, Rodionov, Zemlynichkina,**
NICA/PPD/TH	**3**	**Efremov, Shevchenko, Teryaev**
NUCLOTRON	**2**	**Litvinenko, Piskunov**

Scientific Programme

SPIN-Praha-2013 July 7 - 13, 2013

COMPASS	**10**	**Denisov, Szabelski, Wilfert , Matousek, Pesek, Novy, Bodlak, Krumshtein, Chirikov –Zorin, Anfimov,**
JParc	**1**	**Kuno**
EMUL	**1**	**Artemenkov**
Neutrino	**1**	**Ejiri**
DBD	**1**	**Ejiri**
GDH	**1**	**Laskaris**
PT	**1**	**Plis**
NN	**3**	**Prokofev, Verma, Finger**
Theory	**5**	**Goloskokov, Selyugin, Zavada, Uzikov, Kolganova**

Scientific Programme

SPIN-Praha-2013 July 7 - 13, 2013 *NICA-SPIN-2013*

General Krisch Alan: Future of Polarized Beams

NICA Peshekhonov Dmitry: NICA project at JINR

NICA Spin Physics Detector – NICA/SPD

- **Nagaytsev Alexander: Spin Programme at NICA**
- **Shevchenko Oleg: Drell Yan studies at NICA**
- **Efremov Anatoly: On Nucleon Spin Structure and Drell-Yan**
- **Guskov Alexey: Direct photons**
- **Teryaev Oleg: Final state spin physics at NICA**
- **Shimanski Stepan: High p_T spin physics**
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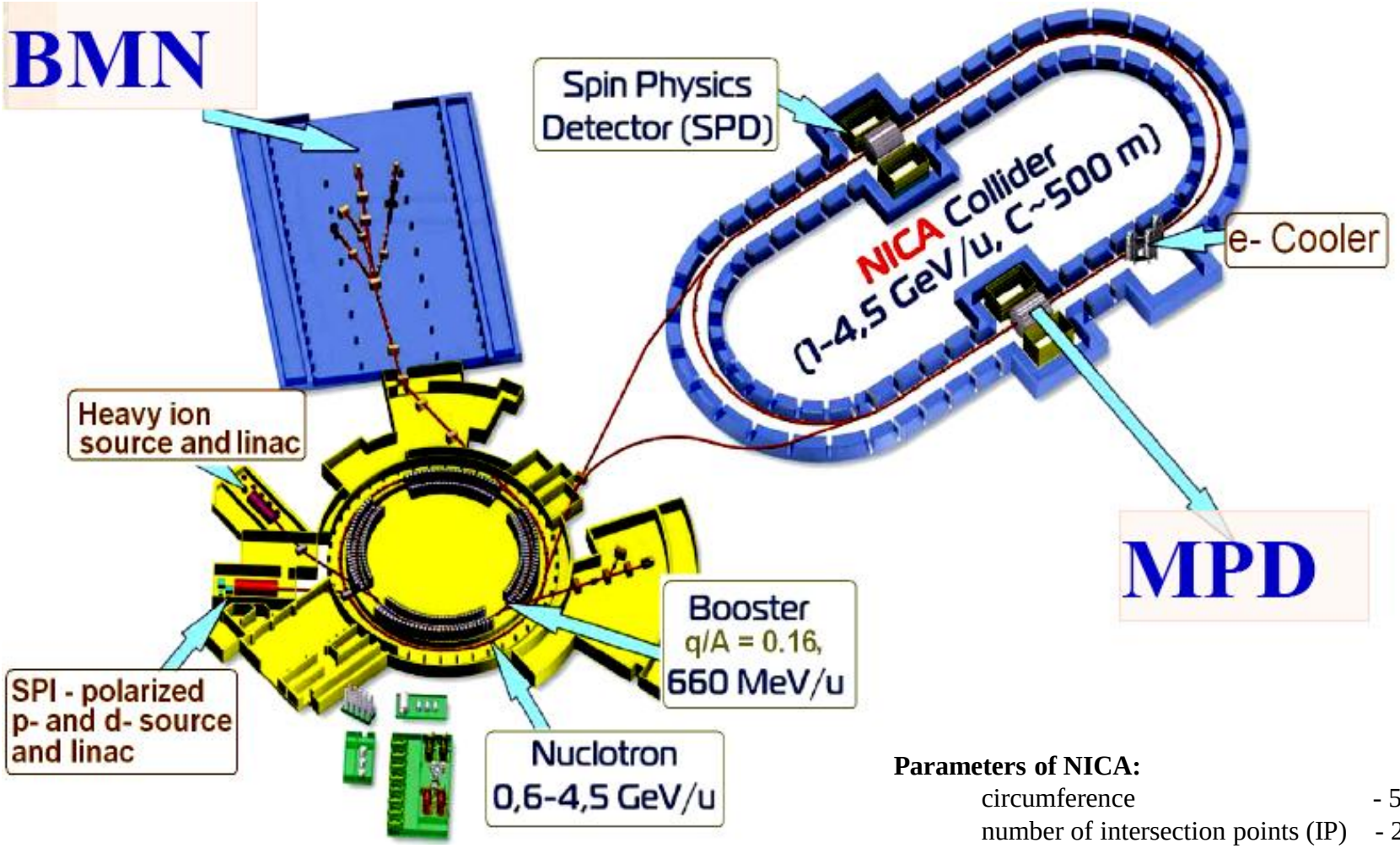
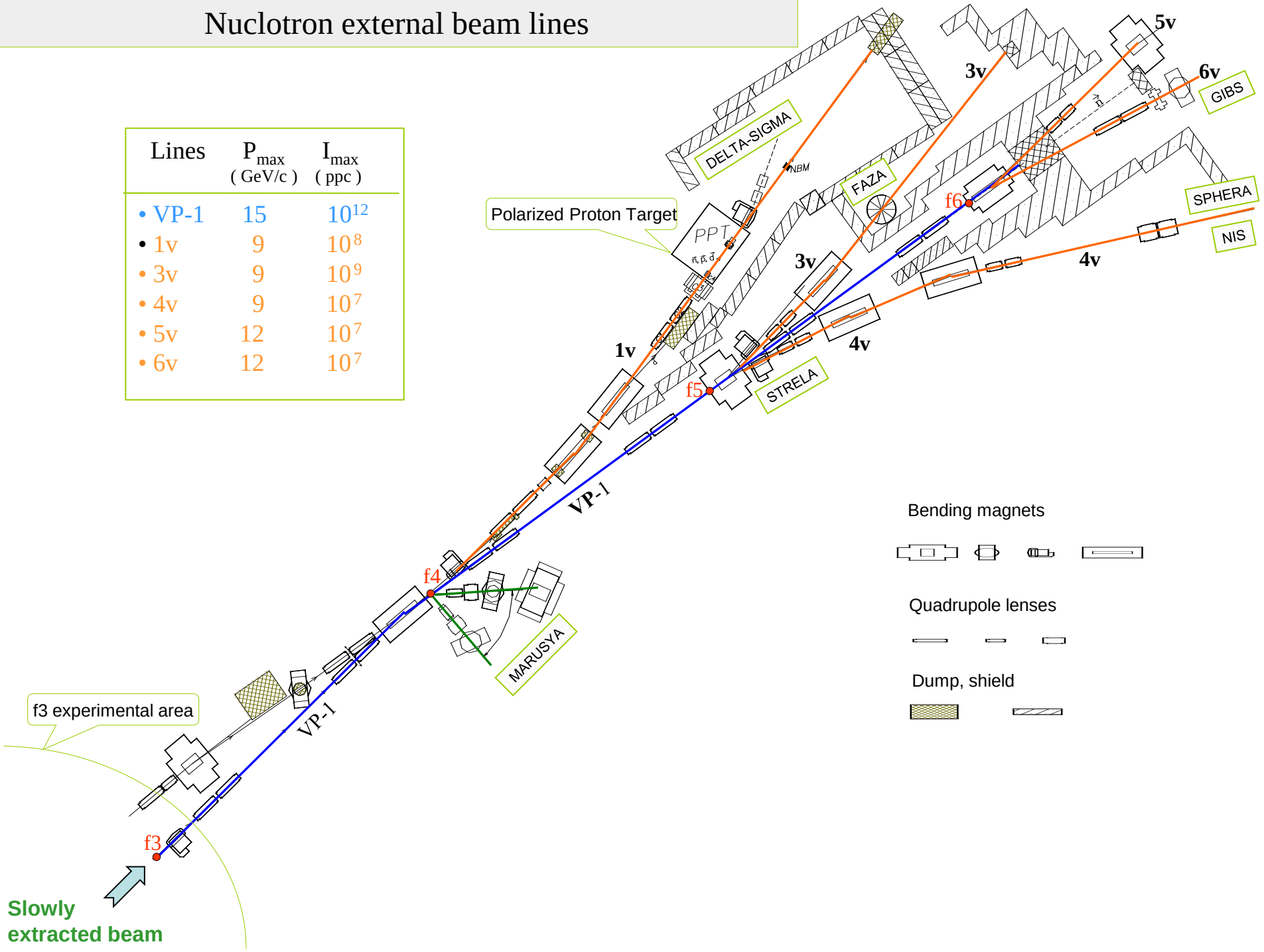


Parameters of NICA:

circumference	- 503 m,
number of intersection points (IP)	- 2,
beta function β_{min} in the IP	- 0.35 m,
number of protons per bunch	- ~$1 \cdot 10^{12}$,
number of bunches	- 22,
RMS bunch length	- 0.5 m,
bunch crossing rate	- 1/60 ns

Nuclotron external beam lines

Lines	P_{max} (GeV/c)	I_{max} (ppc)
• VP-1	15	10^{12}
• 1v	9	10^{8}
• 3v	9	10^{9}
• 4v	9	10^{7}
• 5v	12	10^{7}
• 6v	12	10^{7}



Scientific Programme

SPIN-Praha-2013 July 7 - 13, 2013 *NICA-SPIN-2014*

NICA Spin Physics Detector – NICA/SPD

- **Kovalenko Alexander: Polarized protons and deuterons at NICA**
- **Filatov Iurii: Polarized Proton Beam Acceleration**
- **Kondratenko Anatoliy: Control of Beam Polarization**
- **Shatunov Yury: Full and partial Siberian snakes from helical magnets**
- **Butenko Andrey, Kovalenko Alexander: Injector for Nuclotron/NICA polarized beams**
- **Fimushkin Victor: Status of Polarized Ions Source**
- **Kurilkin Pavel: Proton Beam Polarimetry at Nuclotron and NICA**
- **Kurilkin Pavel: Deuteron Beam Polarization Measurements at the Nuclotron**
- **Rodionov Valery: Preliminary proposal on SPD design**
- **Zemlyanichkina Elena: Estimations of J/Psi measurements**

Scientific Programme

SPIN-Praha-2013 July 7 - 13, 2013 *NICA-SPIN-2014*

NICA Spin Physics Detector – NICA/SPD

- **Akhunzyanov Ruslan: Feasibility of DY at NICA**
- **Mescheryakov Gleb: Estimations of particle rates for SPD**
- **Rossiyskaya Natalia: Background studies for SPD**
- **Anfimov Nikolay, Krumstein Zinoviy: A new electromagnetic calorimeter**
- **Chirikov -Zorin Igor: Design a new electromagnetic calorimeter**
- **Nagaytsev Alexander: Future Drell-Yan experiments**
-

NICA/MPD

- **Murin Yuri: MPD Vertex Detector**
- **Merkin Mikhail: Development of Si Sensors**

Scientific Programme

SPIN-Praha-2013 July 7 - 13, 2013

LHC

ATLAS

- **Sanchez Arturo Rodolfo:** Determination of the Higgs boson spin at ATLAS
- **Grosse-Knetter Joern:** Recent results by the ATLAS Collaboration
- **Malyukov Sergei:** ATLAS detector overview and performance
- **Kiryunin Andrey:** Upgrades of the ATLAS detektor

ALICE

- **Bielcikova Jana:** Recent results from the ALICE experiment
- **Bufalino Stefania:** Upgrades of the ALICE detektor

LHCb

- **Ukleja Artur:** Highlights of LHCb results
- **Anderlini Luzio:** Upgrade of the LHCb detector

Scientific Programme

SPIN-Praha-2013 July 7 - 13, 2013

FAIR

- **Maggiora Marco:** Transverse parton distribution functions in Drell-Yan production at FAIR

FAIR/CBM

- **Heuser Johann:** The CBM Project at FAIR

FAIR/PANDA

- **Maggiora Marco:** The Panda Project at FAIR

RHIC PHENIX

- **Fields Douglas:** Spin Physics at PHENIX

NUCLOTRON

- **Piskunov Nikolay:** ALPOM2 proposal: first measurements
- **Litvinenko Anatoly:** Dependence from atomic mass of the cross section of deuterons fragmentation into cumulative and double-cumulative pions.

Scientific Programme

SPIN-Praha-2013 July 7 - 13, 2013

COMPASS

- **Denisov Oleg:** Study of hadron structure using Drell-Yan scattering
- **Szabelski Adam:** Measurement of TMD observables at COMPASS
- **Wilfert Malte Christian:** Results on A1p and g1p from 2011 COMPASS data

- **Pesek Michael:** Polarization measurements in COMPASS polarized target
- **Matousek Jan:** COMPASS polarized target for Drell-Yan programme
- **Novy Josef:** Prototype of new data acquisition system for COMPASS experiment
- **Bodlak Martin:** COMPASS DAQ upgrades
- **Anfimov Nikolay, Krumstein Zinoviy:** A new electromagnetic calorimeter for COMPASS-II
- **Chirikov -Zorin Igor:** Design a new electromagnetic calorimeter for COMPASS II experiment at CERN
-

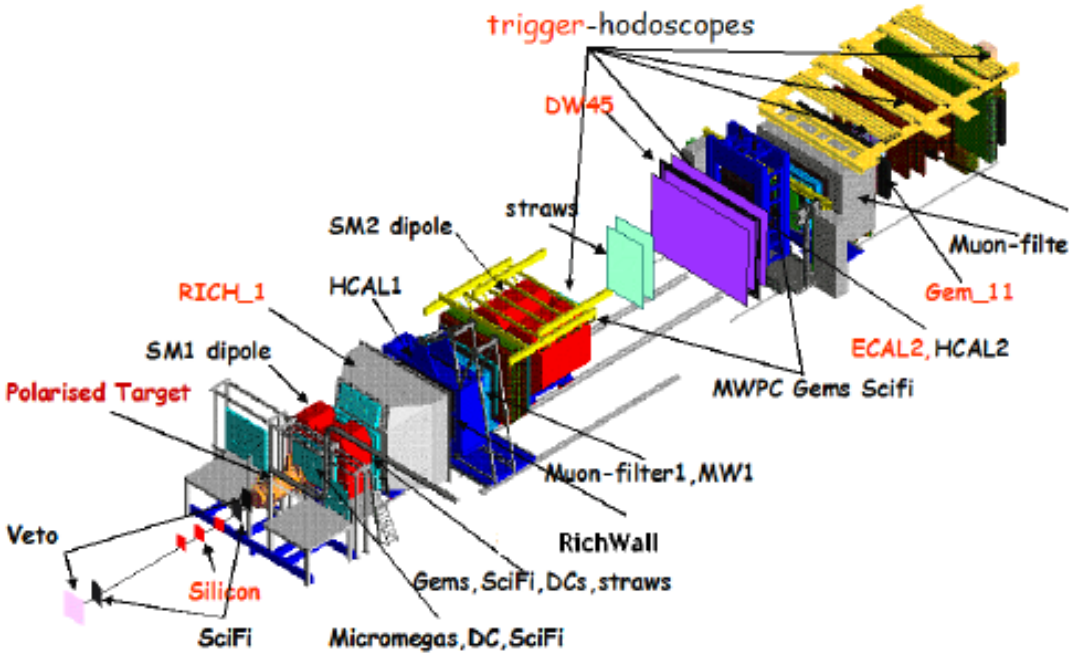
COMPASS facility at CERN

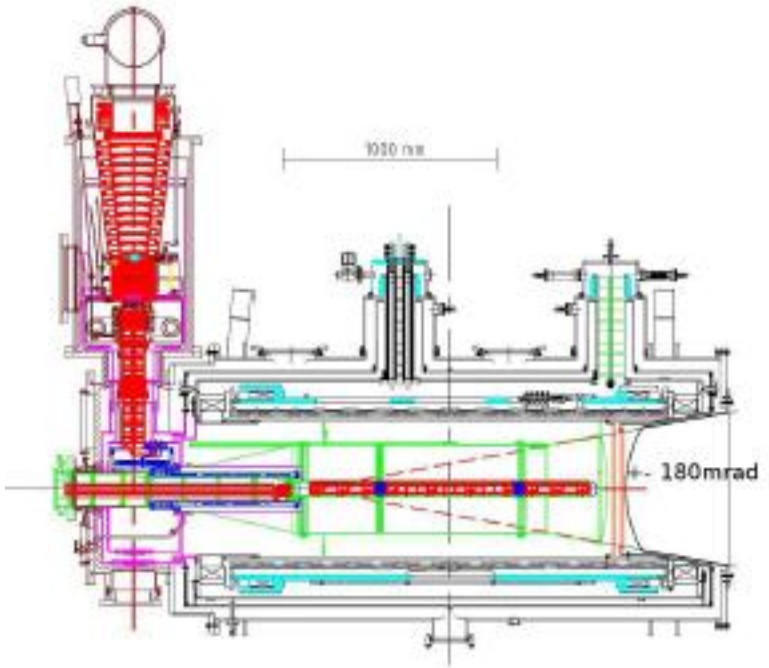
Most important features:

1. Muon or hadron secondary beams
2. Solid state NH_3 (^{6}LiD) target
3. Powerful tracking system – 350 planes
4. PiD – Muon Walls, Calorimeters, RICH

Two stages spectrometer

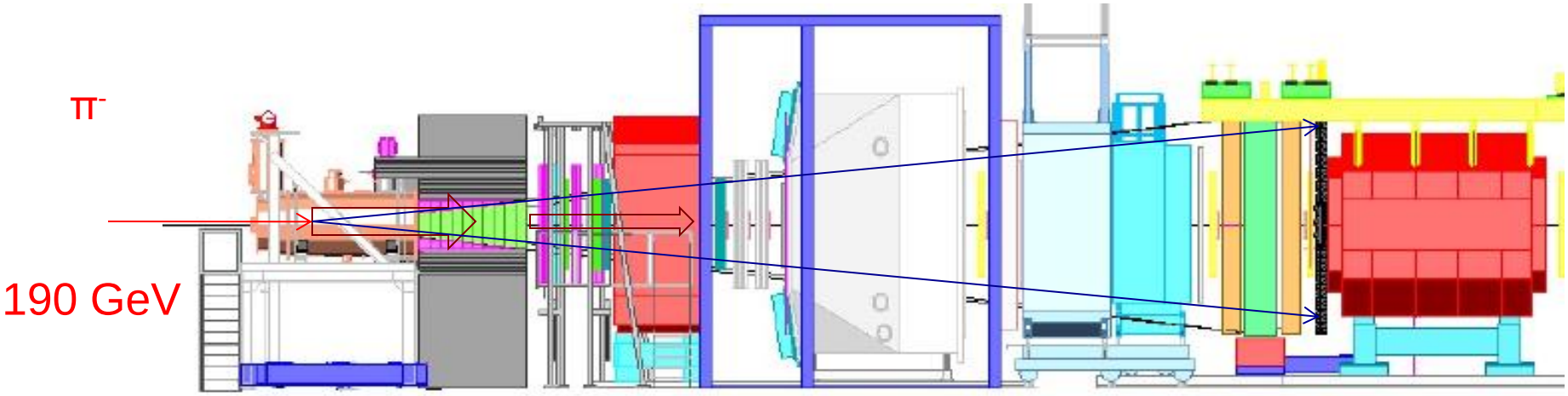
1. Large Angle Spectrometer (LAS)
2. Small Angle Spectrometer (SAS)





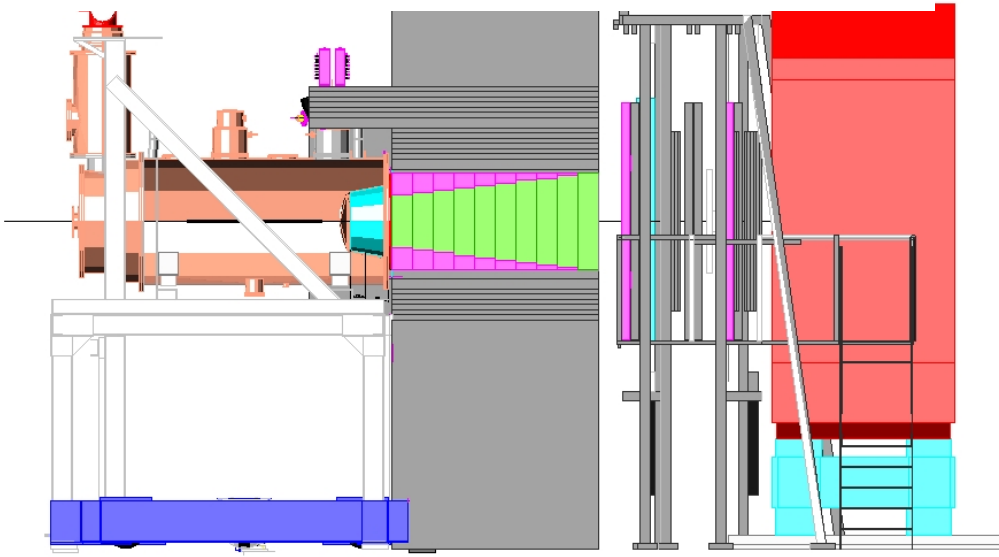
DY@COMPASS - set-up

$\pi^- p \rightarrow \mu^- \mu X$

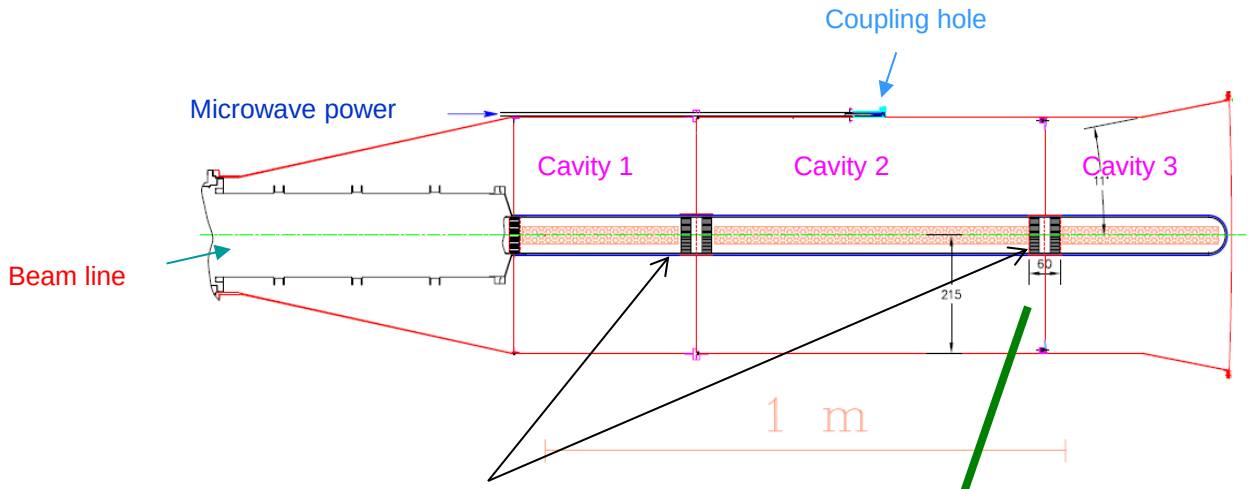


Key elements:

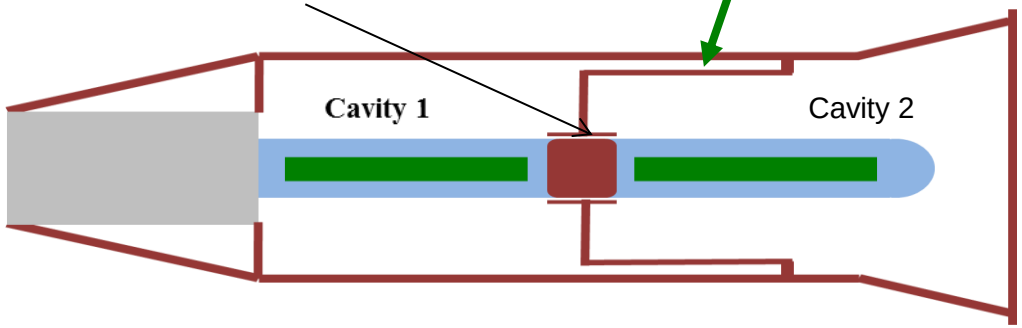
1. COMPASS PT
2. Tracking system (both LAS abs SAS) and beam telescope in front of PT
3. Muon trigger (in LAS is of particular importance - 60% of the DY acceptance)
4. HCal1 based trigger (veto) in LAS (to reduce DY di-muon trigger rate if needed)
5. RICH1, Calorimetry – also important to reduce the background (the hadron flux downstream of the hadron absorber ~ 10 higher then muon flux)



Redesign of the 3-cells cavity into the 2-cells cavity.



These bars show MW-absorbers separating cavities.



Scientific Programme

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JParc

- **Kuno Yoshitaka:** Search for Charged Lepton Flavor Violation at J-PARC

EMUL

- **Artemenkov Denis:** Study of light nuclei cluster structure with nuclear track emulsion

DBD

- **Ejiri Hiroyasu:** Review on double beta decay experiments and neutrino response studies
- **Ejiri Hiroyasu:** Double beta decays and nuclear spin isospin responses for neutrinos

Scientific Programme

SPIN-Praha-2013 July 7 - 13, 2013

PT

Plis Yury: Topics on polarized ion sources including depolarization at acceleration

NN

- **Prokofev Aleksandr: Spin correlation in pp-elastic scattering. Energy dependence**
- **Mchedlishvili David: Polarised nucleon-nucleon scattering experiments at ANKE-COSY**
- **Shindin Roman: Search for dineutron in the nd-p(nn) quasi elastic reaction at energy Tn = 0.55 ^V 2.0 GeV**
- **Laskaris Georgios: First measurements of spin-dependent double-differential cross** sections and the Gerasimov-Hearn integrand from **\vec{^3He(\vec{gamma},n)pp at incident photon energies of 12.8 and 14.7 MeV**

Scientific Programme

SPIN-Praha-2013 July 7 - 13, 2013

THEORY

- **Goloskokov Sergey: Transversity effects in light meson leptoproduction**
- **Selyugin Oleg: Spin effects in elastic scattering at NICA**
- **Uzikov Yury: Polarized deuteron charge exchange reaction dp->(pp)_sX with excitation of the Delta-isobar and the T20 puzzle**
- **Shevchenko Oleg: Direct connection between the different QCD orders for parton distribution and fragmentation functions**

Tribute to the memory of

Boris Stepanovich Neganov

27.4.1928 - 19.8.2012

B.S. Neganov

charismatic personality,
talented and critical physicist,
excellent teacher, colleague and friend of many of us

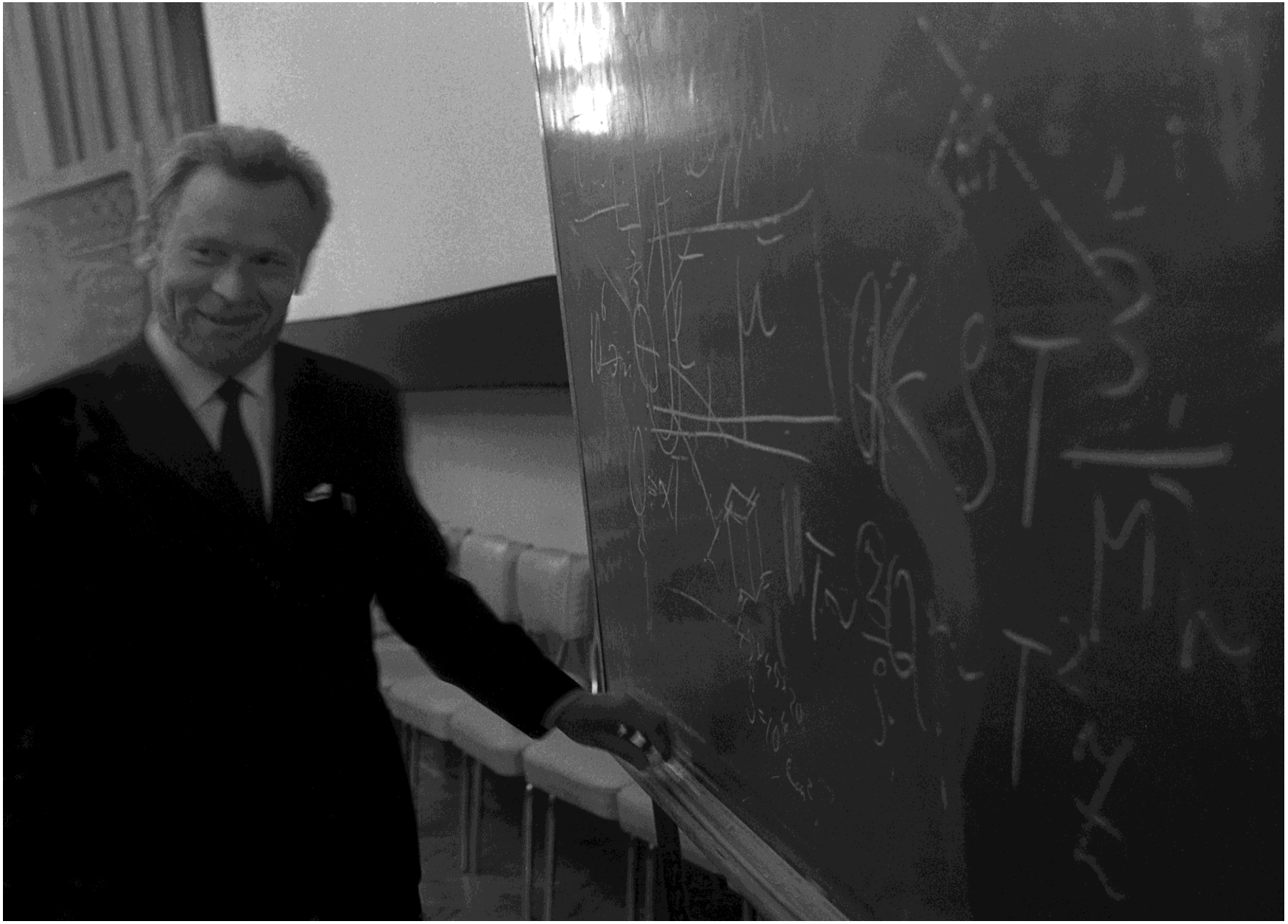
passed away on August 19th, 2012

B.S. Neganov

* has finished his studies at Lenigrad State University in 1951
* since that B.S.N. has been working at the Laboratory, which in 1956 become Laboratory of Nuclear Problems of the Joint Institute for Nuclear Research
* B.S.N. took part in broad research of nucleon-nucleon interactions on 660 MeV proton synchrocyclotron
* since the beginning of sixtieth of the last century B.S.N. was working on the development of the method to obtain low temperatures in mK region by means of 3He-4He refrigeration for physics experiments.

I was privileged to know B.S.N. Since 1963 when I came as PhD student to the NPL JINR in Dubna.

Since that time I was the witness of great successes of B.S.N. at least in three directions, which had the important impact on the spin physics experiments as we know them today.



The pioneering achievements:

1. B. Neganov was the first who obtained very low temperatures based on 3He-4He dilution refrigeration

**** A method for obtaining low temperatures based on dissolution of 3He in 4He.***
B. Neganov, N. Borisov, M. Liburg.
JETP 50 (1966) 1445-1457

**** About the method for obtaining low temperatures by dilution of 3He in 4He.***
B. Neganov.
Preprint JINR, Dubna, 1968, P13-4014

**** A new method for obtaining low temperatures.***
B. Neganov.
News of the Academy os Sciences of the USSR, Nayka 12 (1968) 49-53

The pioneering achievements:

2. B. Neganov was the first who developed frozen spin polarized target based on 3He-4He dilution refrigerator

***** Ultra-low temperatures and proton and deuteron polarized targets.***
B. Neganov, 1967
Conf.Proc. C670207V4 (1967) 300-313. In *Dubna 1967, Proceedings Of The Conference On Electromagnetic Interaction, Vol. 4*, Moscow 1967, 300-313 Conference: C67-02-07
***** Polarized proton target.***
L.B. Parfenov, B.S. Neganov.
Preprint JINR Dubna, 1968, 13-4143
***** Progress in the development of polarized targets.***
B.S. Neganov.
Proceedings of the International Conference on Instrumentation for High Energy Physics, JINR Dubna, USSR, September 8-12,1968, 575-580
***** Frozen polarized proton target.***
N.S. Borisov, E.I. Bunyatova, Yu.F. Kiselev, V.N. Matafonov, B.S. Neganov, Yu.A. Usov
Preprint JINR Dubna, 1976, 13-10253, Part I
***** Frozen polarized proton target.***
N.S. Borisov, E.I. Bunyatova, Yu.F. Kiselev, V.N. Matafonov, B.S. Neganov, Yu.A. Usov
Instrum.Exp.Tech. 21 (1978) 299-308
***** Proton Polarized Frozen Target for High-energy Particle Secondary Beams.***
N.S. Borisov, E.I. Bunyatova, A.G. Volodin, M.Yu.Liburg, V.N. Matafonov, A.B.Neganov, B.S. Neganov, Yu.A. Usov. JINR Dubna, 1980, Preprint 1-80-98, 12 pp.

The pioneering achievements:

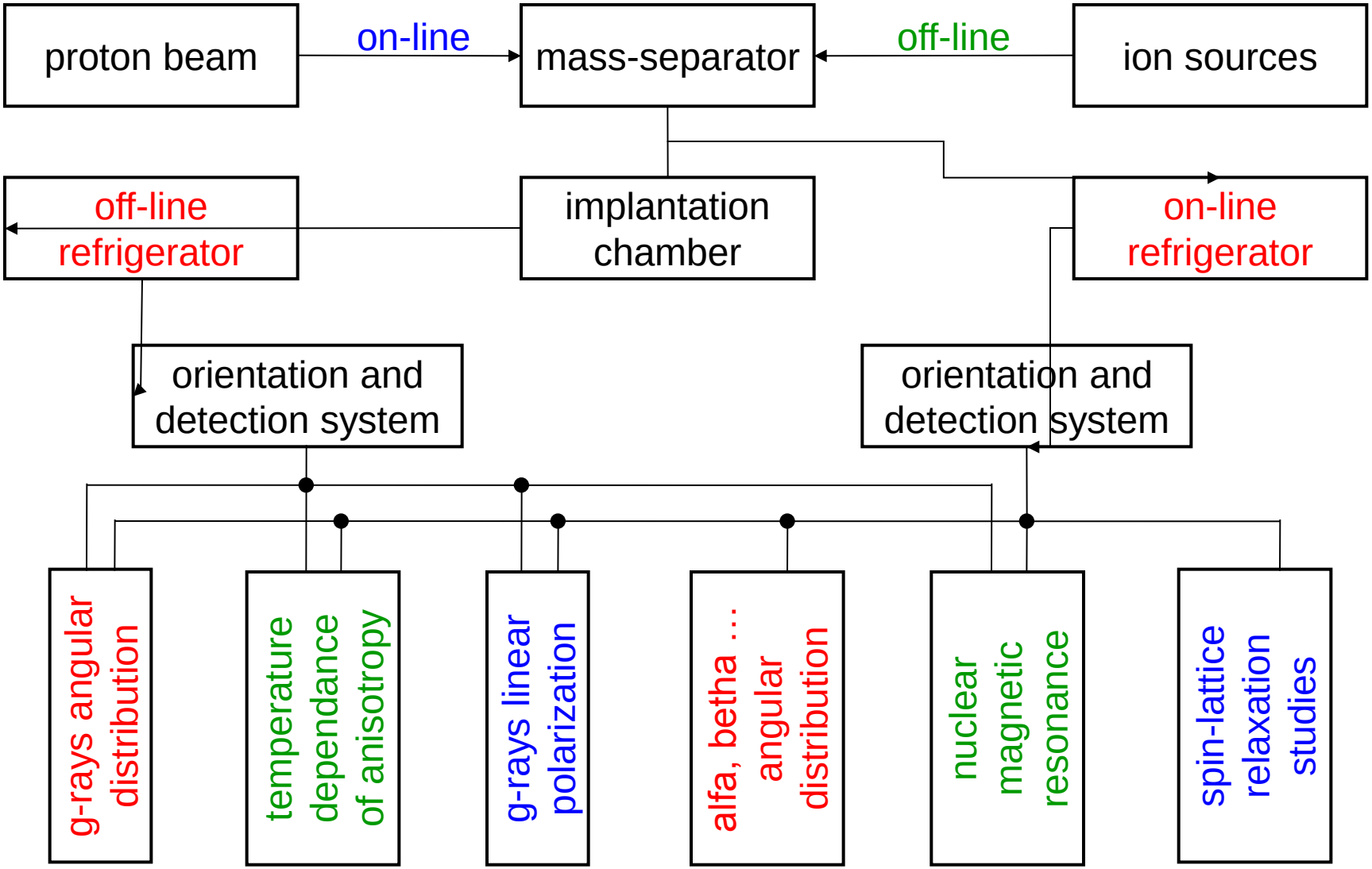
3. B. Neganov was the first who developed the system for low temperature nuclear orientation of short lived nuclei.

**** SPIN Facility.***
I. Navratil, B.S. Neganov, J. Ota, V.N. Pavlov, M. Finger, V.M. Tsupko-Sitnikov
JINR Dubna (1976) CM2-1604, 39 pp.

**** A Combined 3He-4He Dilution Refrigerator.***
V.N.Pavlov, B.S.Neganov, J.Konicek, J.Ota.
Preprint JINR, Dubna, 1977, P8-10660, 15 pp. and Cryogenics.

**** Facility for the Study of the Decay of Oriented Nuclei: SPIN Facility. .***
I.I.Gromova, J. Dupak, J. Konicek, T.I.Kratsikova, N.A.Lebedev, B.S.Neganov et al.
Preprint JINR, Dubna, 1978, P13-11363, 20 pp. and Prikl. Nucl. Spectroscopy.

SPIN – YASNAPP-2 FACILITY: AVAILABLE EXPERIMENTS



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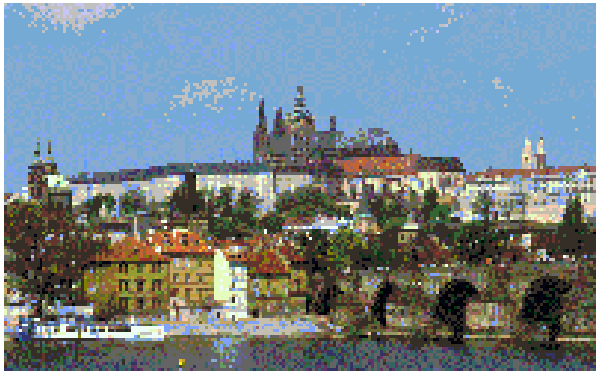
SPIN-Praha-2015



Prague, Czech Republic

July, 2015

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Thank you!