Status of the CREMLIN+ Detector School

Sergey Kononov

Budker Institute of Nuclear Physics

International Organizing Committee meeting

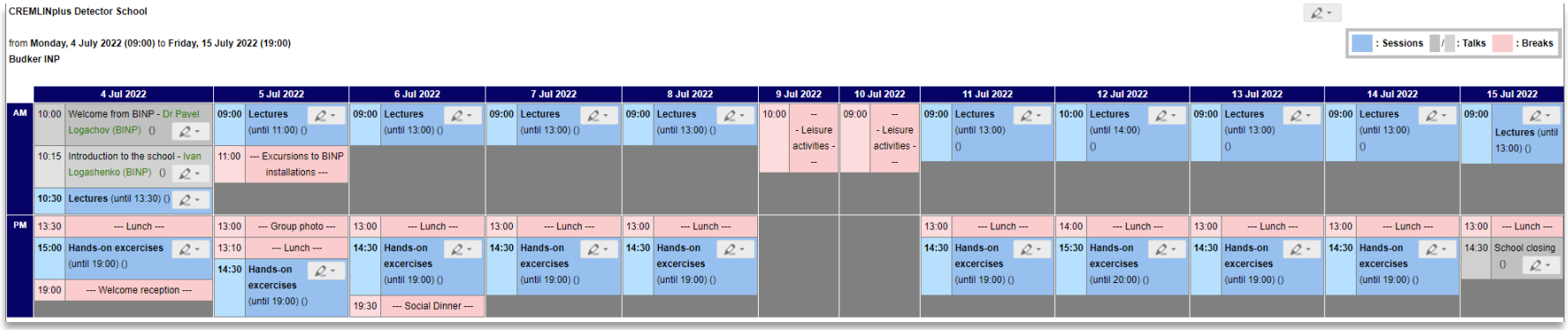
March 10, 2021

Organizational plan

- ✓ Hold first LOC and IOC meetings and make them regular
- ✓ Gather ideas for the school
- ✓ Compile preliminary list of lectures and hands-on experiments
- ✓ Define max number of participants: about 50
- ✓ Determine the scope and format: Ion/nuclear physics, Particle physics, Neutron physics; lectures and elective hands-on exercises
- ✓ Define the date and duration: **July 4-15, 2022 (12 days)**
- ➢ Set up website and/or Indico
- ➢ Find lecturers
- ❑ Announce and advertise
- ❑ Organize student admission and selection
- ❑ Prepare the hands-on experiments
- ❑ Hold the school

Web resources

- Wiki-page for organizers: https://ctd.inp.nsk.su/wiki/index.php/Detector_school_CREMLINplus
- Indico page of the School: https://indico.inp.nsk.su/event/41/



CREMLINplus Detector School

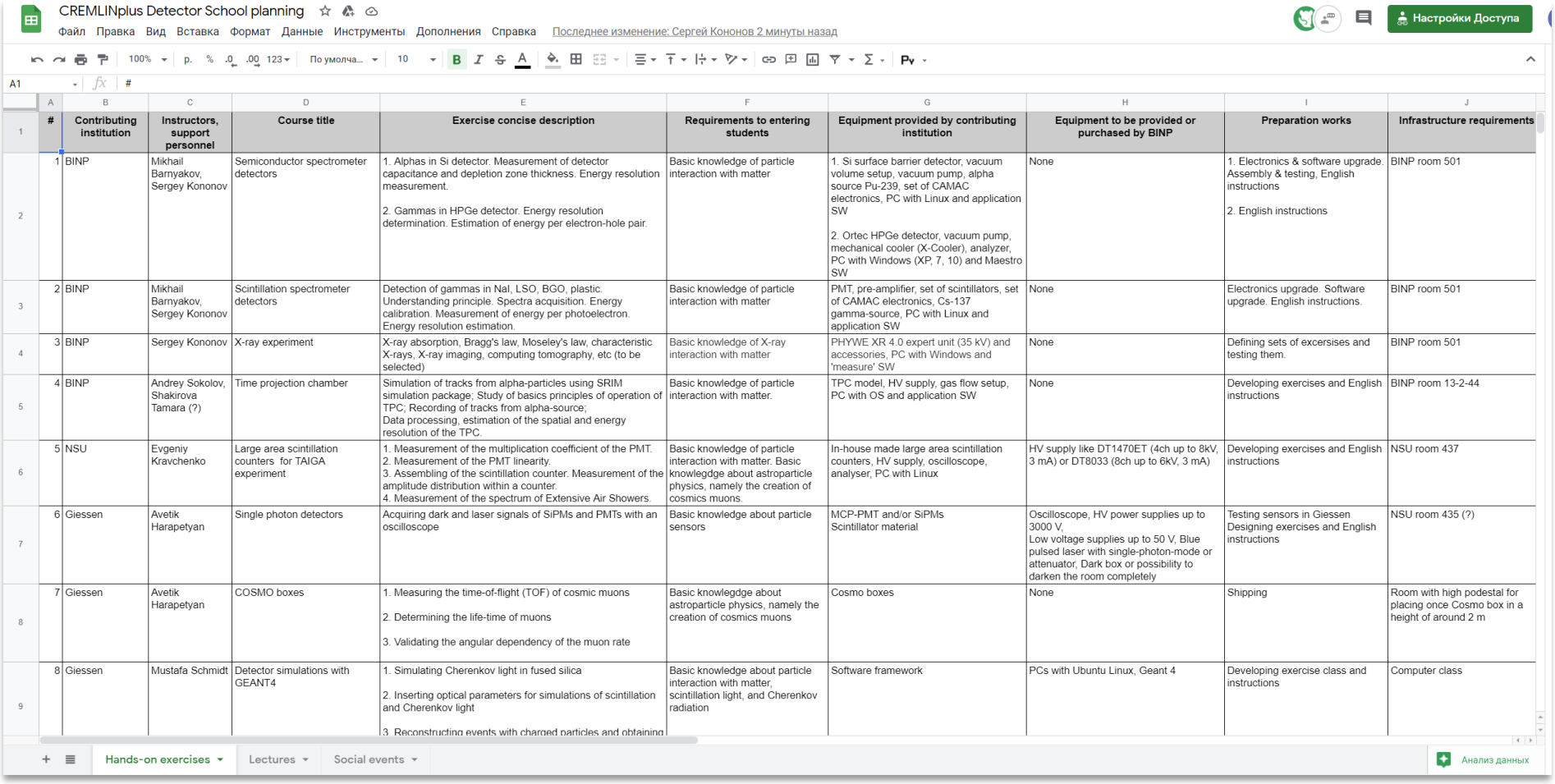
from Monday, 4 July 2022 (09:00) to Friday, 15 July 2022 (19:00)
Budker INP

: Sessions / : Talks : Breaks

	4 Jul 2022	5 Jul 2022	6 Jul 2022	7 Jul 2022	8 Jul 2022	9 Jul 2022	10 Jul 2022	11 Jul 2022	12 Jul 2022	13 Jul 2022	14 Jul 2022	15 Jul 2022
AM	10:00 Welcome from BINP - Dr Pavel Logachov (BINP) () 10:15 Introduction to the school - Ivan Logashenko (BINP) () 10:30 Lectures (until 13:30) ()	09:00 Lectures (until 11:00) () 11:00 --- Excursions to BINP installations ---	09:00 Lectures (until 13:00) ()	09:00 Lectures (until 13:00) ()	09:00 Lectures (until 13:00) ()	10:00 -- - Leisure activities - --	09:00 -- - Leisure activities - --	09:00 Lectures (until 13:00) ()	10:00 Lectures (until 14:00) ()	09:00 Lectures (until 13:00) ()	09:00 Lectures (until 13:00) ()	09:00 Lectures (until 13:00) ()
PM	13:30 --- Lunch --- 15:00 Hands-on excercises (until 19:00) () 19:00 --- Welcome reception ---	13:00 --- Group photo --- 13:10 --- Lunch --- 14:30 Hands-on excercises (until 19:00) ()	13:00 --- Lunch --- 14:30 Hands-on excercises (until 19:00) () 19:30 --- Social Dinner ---	13:00 --- Lunch --- 14:30 Hands-on excercises (until 19:00) ()	13:00 --- Lunch --- 14:30 Hands-on excercises (until 19:00) ()			13:00 --- Lunch --- 14:30 Hands-on excercises (until 19:00) ()	14:00 --- Lunch --- 15:30 Hands-on excercises (until 20:00) ()	13:00 --- Lunch --- 14:30 Hands-on excercises (until 19:00) ()	13:00 --- Lunch --- 14:30 Hands-on excercises (until 19:00) ()	13:00 --- Lunch --- 14:30 School closing ()

- Planning spreadsheet: https://docs.google.com/spreadsheets/d/1GhG-1pajMyffXE6BPpqz_VzSh1T-qbjMA-s3MtKKdoI/edit?usp=sharing
  - Hands-on exercises
  - Lectures
  - Social events

List of Hands-on exercises



CREMLINplus Detector School planning

Файл Правка Вид Вставка Формат Данные Инструменты Дополнения Справка Последнее изменение: Сергей Кононов 2 минуты назад

Настройки Доступа

#	Contributing institution	Instructors, support personnel	Course title	Exercise concise description	Requirements to entering students	Equipment provided by contributing institution	Equipment to be provided or purchased by BINP	Preparation works	Infrastructure requirements
1	BINP	Mikhail Barnyakov, Sergey Kononov	Semiconductor spectrometer detectors	1. Alphas in Si detector. Measurement of detector capacitance and depletion zone thickness. Energy resolution measurement. 2. Gammas in HPGe detector. Energy resolution determination. Estimation of energy per electron-hole pair.	Basic knowledge of particle interaction with matter	1. Si surface barrier detector, vacuum volume setup, vacuum pump, alpha source Pu-239, set of CAMAC electronics, PC with Linux and application SW 2. Ortec HPGe detector, vacuum pump, mechanical cooler (X-Cooler), analyzer, PC with Windows (XP, 7, 10) and Maestro SW	None	1. Electronics & software upgrade. Assembly & testing, English instructions 2. English instructions	BINP room 501
2	BINP	Mikhail Barnyakov, Sergey Kononov	Scintillation spectrometer detectors	Detection of gammas in NaI, LSO, BGO, plastic. Understanding principle. Spectra acquisition. Energy calibration. Measurement of energy per photoelectron. Energy resolution estimation.	Basic knowledge of particle interaction with matter	PMT, pre-amplifier, set of scintillators, set of CAMAC electronics, Cs-137 gamma-source, PC with Linux and application SW	None	Electronics upgrade. Software upgrade. English instructions.	BINP room 501
3	BINP	Sergey Kononov	X-ray experiment	X-ray absorption, Bragg's law, Moseley's law, characteristic X-rays, X-ray imaging, computing tomography, etc (to be selected)	Basic knowledge of X-ray interaction with matter	PHYWE XR 4.0 expert unit (35 kV) and accessories, PC with Windows and 'measure' SW	None	Defining sets of excersises and testing them.	BINP room 501
4	BINP	Andrey Sokolov, Shakirova Tamara (?)	Time projection chamber	Simulation of tracks from alpha-particles using SRIM simulation package; Study of basics principles of operation of TPC; Recording of tracks from alpha-source; Data processing, estimation of the spatial and energy resolution of the TPC.	Basic knowledge of particle interaction with matter.	TPC model, HV supply, gas flow setup, PC with OS and application SW	None	Developing exercises and English instructions	BINP room 13-2-44
5	NSU	Evgeniy Kravchenko	Large area scintillation counters for TAIGA experiment	1. Measurement of the multiplication coefficient of the PMT. 2. Measurement of the PMT linearity. 3. Assembling of the scintillation counter. Measurement of the amplitude distribution within a counter. 4. Measurement of the spectrum of Extensive Air Showers.	Basic knowledge of particle interaction with matter. Basic knowlegdge about astroparticle physics, namely the creation of cosmics muons.	In-house made large area scintillation counters, HV supply, oscilloscope, analyser, PC with Linux	HV supply like DT1470ET (4ch up to 8kV, 3 mA) or DT8033 (8ch up to 6kV, 3 mA)	Developing exercises and English instructions	NSU room 437
6	Giessen	Avetik Harapetyan	Single photon detectors	Acquiring dark and laser signals of SiPMs and PMTs with an oscilloscope	Basic knowledge about particle sensors	MCP-PMT and/or SiPMs Scintillator material	Oscilloscope, HV power supplies up to 3000 V, Low voltage supplies up to 50 V, Blue pulsed laser with single-photon-mode or attenuator, Dark box or possibility to darken the room completely	Testing sensors in Giessen Designing exercises and English instructions	NSU room 435 (?)
7	Giessen	Avetik Harapetyan	COSMO boxes	1. Measuring the time-of-flight (TOF) of cosmic muons 2. Determining the life-time of muons 3. Validating the angular dependency of the muon rate	Basic knowlegdge about astroparticle physics, namely the creation of cosmics muons	Cosmo boxes	None	Shipping	Room with high podestal for placing once Cosmo box in a height of around 2 m
8	Giessen	Mustafa Schmidt	Detector simulations with GEANT4	1. Simulating Cherenkov light in fused silica 2. Inserting optical parameters for simulations of scintillation and Cherenkov light 3. Reconstructing events with charged particles and obtaining	Basic knowledge about particle interaction with matter, scintillation light, and Cherenkov radiation	Software framework	PCs with Ubuntu Linux, Geant 4	Developing exercise class and instructions	Computer class

Hands-on exercises | Lectures | Social events | Анализ данных

Lectures

1. BINP HEP facilities
2. Tracking
3. Calorimetry
4. Silicon detectors
5. Neutron detection
6. Particle identification
7. Photodetectors
8. Gaseous detectors
9. Trigger and Data Acquisition
10. ASIC design
11. FPGA programming
12. Test beam analysis
13. Historical evolution of tracking detectors at e+e- colliders → Franco Grancagnolo

OR — Nicola De Filippis

Social events

1. Welcome party (Reception) - July 4, 2-3 hours
2. Conference dinner - July 6, 3 hours
3. Trip along the Ob river - 1 weekend day
4. …

Current expenses

- 2 FPGA kits for exercise “Introduction to FPGA”. (L.Epshtein), ~3810 Euro
- Desktop HVS for exercise “Large area scintillation counters for TAIGA experiment” (E.Kravchenko), ~6900 Euro
- GEMs for exercise “Time projection chamber” (A.Sokolov), >1860 Euro

Overlaps with other schools

- TIFR School (under ICFA supervision) – March 2022 in Mumbai, India
- Excellence in Detector and Instrumentation Technologies (EDIT) – July 4-14, 2022 at IHEP, Beijing, China (dates can not be adjusted as it is bound to beam time)

Summarized opinion of EDIT organizers:
It is not ideal to have overlapping schools on similar topics. But the previous schools were always oversubscribed with the prevalence of the attendees from a host country. There might be a competition for good lecturers, but it will not be a big problem.

- What do we do about it?