

## Workshop Program

8<sup>th</sup> „Georgian – German School and Workshop in Basic Science“

**GGSWBS'18**

August 19 – August 25, Tbilisi, Georgia

– **Science at Multidisciplinary SMART|Labs in Georgia** –

### Topics:

- Symmetries in Subatomic Physics (T- and CP- Violations)
- Electric Dipole Moment (EDM) Searches (e.g. JEDI project)
- Standard Model and Beyond (Theory, HEP Experiments)
- Atmospheric Chemistry and Climate Research
- Numerical Schemes and Modeling
- Nuclear Medicine and Chemistry
- Medical Imaging and Biomarkers
- Complementary Imaging Methods: Hybrid MRI-PET
- Engineering Sciences (Simulation, Instrumentation, Electronics)
- **Satellite topical lecturing/training courses for students**

### Venue and general schedule of the meeting:

**Sun, August 19:** Arrival (*early morning*); Tbilisi Tour (14:00 – 18:30)  
Registration & Welcome Reception (19:30 – 22:00)  
(*MUZA, 'Kus Tba' road, Tbilisi*)

**Mon, Tue (August 20, 21):** Ivane Javakhishvili Tbilisi State University (**TSU**)  
(*Chavchavadze ave. 1, Main building*)

**Wed, August 22:** Social program (9:30 – 21:00)  
(*Excursion: Day trip to Khaketi*)

**Thu, Fri (August 23,24):** (**TSU, AUG**)  
(*Chavchavadze ave. 1; Agmashenebeli alley 240*)

**Sat, August 25:** Departure (*after midnight*)

August 20, Monday (Workshop, TSU) 10<sup>00</sup> – 19<sup>00</sup>

## Existing and Future Cooperation

### **Plenary opening session (auditorium 107) (10:00 – 11:00)**

#### **Welcome/Opening Address (5'):**

- **Alexander Tsiskaridze**, Vice-Rector of TSU
- **Alexander Tevzadze**, Deputy Minister of Education, Science, Culture and Sport
- **Manana Mikaberidze**, Director General of SRNSF
- **Hans Ströher**, Director of IKP/FZJ: „*Scope of the Workshop*“

### **Plenary session 1** (auditorium 107): **Convener – Alexander Tsiskaridze (11:00 – 13:30)**

- **Hans Ströher (FZJ/IKP)** – *Frontiers of Fundamental Physics* (30')
- **Jon Shah (FZJ/INM)** – *Medical Imaging (Hybrid MRI-PET)* (30')

**12:00 – 12:30** Coffee break (+ conference photo)

- **Andreas Wahner (FZJ)** – *Atmospheric Chemistry (common project with TSU)* (30')
- **Bernd Neumaier (FZJ)** – *Radiotracers for PET App's. (perspectives for collabor.)* (30')

**13:30 – 15:00** Lunch break

### **Plenary session 2** (auditorium 107): **Convener – Hans Ströher (15:00 – 16:30)**

- **Akaki Rusetsky (Bonn)** – *Hadron Physics in the Era of Big Computers* (30')
- **Gergely Barnafoldi (Budapest)** – *Theor. and Exp. Invest. of the Strongly Interacting Matter* (30')
- **Sabine Dues (FZJ/ICS)** – *Structural Biochemistry projects (overview of ICS-6)* (30')

**16:30 – 17:00** Coffee break

### **Awarding Ceremony** (auditorium 107): **Convener – Alexander Tsiskaridze (17:00 – 18:00)**

- **Public Lecture – Prof. Ulf-G. Meißner (Bonn/FZJ):**  
*Life on Earth - an Accident ?* (40')
- **Discussion, Conversation and Get-Together (reception/photo session/interviews)**

**19<sup>30</sup> Social program** (TSU Welcome dinner, „Shadow of Metekhi“ restaurant)

August 21, Tuesday ([Workshop, TSU](#)) 9<sup>00</sup> – 18<sup>00</sup>

## Existing and Future Cooperation

### Plenary session 3 (auditorium 107): Convener – **Andreas Wahner (09:00 – 13:00)**

- **Astrid Kiendler-Scharr (FZJ/IEK)** – *Climate Change: current knowledge (30')*
- **Hendrik Elbern (FZJ/IEK)** – *Atmospheric Models with Data (30')*
- **Ghaleb Natour (FZJ/ZEA-1)** – *Technology for Excellent Science (30')*
- **Stefan van Waasen (FZJ/ZEA-2)** – *Advanced Computing (30')*

**11:00 – 11:30** Coffee break

- **Thomas Kress (RWTH Aachen)** – *High Energy Physics experiments at CERN (30')*
- **Harald Glueckler (FZJ/ZEA)** – *Spectrometer and detector const./design/fabric. (30')*
- **Jörg Mauler (FZJ/INM-4)** – *MR Spectroscopy (30')*
- **David Arutinov (FZJ/ZEA-2)** – *Development of a new PET-MRI prototype (30')*

**13:00 – 14:30** Lunch break

### Science at SMART|EDM\_Lab

#### Parallel session 1 (auditorium 07): Convener – **Mikheil Nioradze (14:30 – 18:00)**

- **Jörg Pretz (FZJ/IKP)** – *JEDI project at COSY/Juelich (30')*
- **Zurab Berezhiani (L'Aquila, Italy)** – *Puzzling neutron: window to new physics ? (30')*
- **Zara Bagdasarian (FZJ/IKP)** – *Neutrino hunters around the world (30')*

**16:00 – 16:30** Coffee break

- **Vakhtang Kartvelishvili (Lancaster)** – *Quarkonium spectroscopy in ATLAS (30')*
- **Jambul Gegelia (FZJ/TSU)** – *Eff. field theory and derivation of Salam-Weinberg model (30')*

### Science at SMART|Atmo\_Sim Lab

#### Parallel session 2 (auditorium 107): Convener – **Bezhan Chankvetadze (14:30 – 18:00)**

- **Giorgi Jibuti (TSU)** – *Project overview: smart platform-sensors and drones (30')*
- **R. Botchorishvili (TSU)** – *Proj. overview: numerical modelling, measur.'s and machine learning*
- **Marine Arabidze (NEA, Georgia)** – *Air quality monitoring system in Georgia: challenges and perspectives (30')*

**16:00 – 16:30** Coffee break

- **Hanno Scharr (FZJ/IBG-2)** – *Computer vision crash course (part 1, 90')*

### Science at SMART|Medical (MRI + BioMed) Lab

#### Parallel session 3 (auditorium 101): Convener – **(J. Shah & B. Neumaier) (14:30 – 18:00)**

- **Ezequiel Farrher (FZJ/INM-4)** – *Quantitative MRI (Methods) (30')*
- **Elene Iordanishvili (FZJ/INM-4/GTU)** – *Quantitative MRI (Application) (30')*
- **Jon Shah (FZJ/INM-4)** – *MR-PET (30')*

**16:00 – 16:30** Coffee break

- **M. Kelenjeridze (INM-4/GTU)** – *Develop. of an MRI antenna array for MR-PET imaging (30')*
- **Swen Humpert (FZJ/INM-5)** – *<sup>18</sup>F-labeled peptides for diagnosis of Alzheimer's disease (30')*

**19<sup>30</sup>** Dinner at Hotel „Tbilisi Orion“

August 23, Thursday (School Part at TSU) 9<sup>30</sup> – 18<sup>00</sup>

### Ongoing projects at SMART|EDM\_Lab

#### Parallel session 4 (auditorium 07): Convener – Hans Ströher (09:30 – 13:00)

- Irakli Keshelashvili (FZJ/IKP) – *Work in Juelich (det. & target) (overview) (30')*
- David Mchedlishvili (TSU) – *Work in Tbilisi (overview) (30')*
- Fabian Mueller (FZJ/IKP) – *Polarimetry for srEDM measurements (30')*

11:00 – 11:30 Coffee break

- David Arutinov (FZJ/ZEA-2) – *3D chip (introductory lecture) (30')*
- Dito Shergelashvili (TSU, PhD) – *Polarimeter electronics and data readout (20')*
- Otari Javakhishvili (AUG, Master) – *Power supply developments for polarimeter (20')*
- Giorgi Kvantrishvili (TSU, Master) – *Axion search: plans at COSY (20')*

13:00 – 14:30 Lunch break

#### Parallel session 5 (auditorium 07): Convener – Hans Ströher (14:30 – 18:00)

- Practical for students: Detlev Gotta, Gogi Macharashvili, Irakli Keshelashvili – *Detector Physics and Simulations in Experimental Particle Physics*

### Ongoing projects at SMART|Atmo\_Sim Lab

#### Parallel session 6 (auditorium 107): Convener – Astrid Kiendler-Scharr (09:30 – 13:00)

- Robert Wegener (FZJ/IEK) – *Diurnal and annual cycle of Nitrogen Oxides (35')*
- Iulia Gensch (FZJ/IEK) – *The hydrocarbon clock: a tool to distinguish between mixing and reaction during the atmospheric transport (35')*
- Tako Janelidze (FZJ/IEK) – *Novel adjoint advection schemes for Atmo Chemistry (25')*

11:00 – 11:30 Coffee break

- Ketevan Kharashvili (TSU) – *Current projects at AtmoSim\_lab (25')*
- Ana Dolidze (TSU) – *Studying advection schemes of EURAD-IM model (25')*
- Robert Wegener (FZJ/IEK) – *Introduction to atmospheric modelling (lecture, 40')*

13:00 – 14:30 Lunch break

#### Parallel session 7.1 (auditorium 107): Convener – Giorgi Jibuti (14:30 – 18:00)

- Practical for students: Robert Wegener – *Atmospheric modeling*

#### Parallel session 7.2 (auditorium 06): Convener – Ramaz Botchorishvili (14:30 – 18:00)

- Lectures for students: Hanno Scharr – *Computer vision crash course (part 2)*

### Work planned for SMART|Medical\_Lab's

#### Parallel session 8 (auditorium 101): Convener – Revaz Shanidze (09:30 – 13:00)

- Jon Shah (FZJ/INM-4) – *SMART lab in frame of National Imaging Facility (NIF) (30')*
- Bernd Neumaier (FZJ/INM-5) – *SMART lab in cooperation with TSU ? (30')*
- Tamar Khechiashvili (FZJ/INM-4/GTU) – *My experience in Juelich as a PhD*
- Ana Gogishvili (FZJ/INM-4/GTU) – *My experience in Juelich as a Master student*
- Bernd Neumaier (FZJ/INM-5) – *Basics of molecular imaging*
- Bela Bochorishvili (RICM<sup>1</sup>/TSU) – *Physics of radiation therapy*

13:00 – 14:30 Lunch break

**Parallel session 9 (auditorium 101): Convener – Revaz Shanidze (14:30 – 18:00)**

- **Revaz Shanidze (TSU)** – *Nuclear Medicine Physics in TSU*
- **Giorgi Gavashelishvili (RMC<sup>2</sup>)** – *Cyclotron production of radiopharmaceuticals for PET*
- **Maia Topeshashvili (RICM<sup>1</sup>/TSU)** – *Quality control and quality assurance in radiotherapy*

**Students presentations:**

- **Nino Chichiveishvili (TSU)** – *The ability to use the sustainable suspension of silver nanoparticles in medicine*
- **Otari Gokhadze (TSU)** – *Influence of some food additive 'cocktail' on white rats organism*
- **Media Abramishvili (TSU)** – *Radioisotops for nuclear medicine in Georgia*
- **Mariam Abuladze (AUG/TSU)** – *Geant4 in nuclear medicine physics*
- **Tea Avaliani (TSU)** – *Brachytherapy treatment planning*
- **Nino Batselashvili (TSU)** – *Teletherapy treatment planning*

<sup>1</sup>**RICM** – Research Institute of Clinical Medicine (Medical Center of Acad. Todua)

<sup>2</sup>**RMC** – Radiation Medicine Center

August 23, Thursday (School Part at AUG) 9<sup>30</sup> – 18<sup>00</sup>

Program for Agricultural University of Georgia (AUG)  
(SMART|Engineering\_Lab)

9:30 Departure to AUG

**Participants:**

- School of Engineering and Technology
- Department of Chemistry
- Department of Biology
- FZJ guests: Ghaleb Natour, Harald Glueckler, Stefan van Waasen, Sabine Dues
- LONZA Cologne GmbH: Claus-Dietmar Pein (director of the company)

**Welcome:**

- 10:30 – 11:00 – Welcome meeting of guests from FZJ with the management of AUG  
– Signing of the Internship Agreement/Declaration between AUG-ZEA (-1,-2)
- 11:00 – 12:00 – Tour in the Kakha Bendukidze campus of AUG/FUT:  
Visiting laboratories, research facilities, library and museum

**Parallel session 10 (AUG, Engineering dep.): Convener – Zaza Metreveli (12:00 – 16:30)**  
**Students presentations:**

**12:00 – 13:00 Department of Mechanical Engineering**

- Giorgi Gvasalia, Beqa Sanodze – Turbo Jet Engine (15+5')
- Davit Togonidze, Mirian Bejitadze – Robotic Arm (15+5')
- Luka Janjghava, Dudu Mamatsashvili – Hydraulic Excavator (15+5')

13:00 – 14:30 Lunch break (at the culinary academy of AUG)

**14:30 – 15:30 Department of Electrical and Computer Engineering**

- Nino Anasova – Portable low frequency spec. analyzer for biomedical purposes (10+5')
- Avtandil Lomidze – Psycho emotional cond. estim. system for operators in industry (10+5')
- Aleksandre Kalandadze – Intellectual device for the fast charging of electric cars, adopted for the conditions in Georgia (10+5')
- Rati Chkhetia – Automated device for animal monitoring in national parks (10+5')

**15:30 – 16:00 Department of Chemistry**

- Nodar Dumbadze – Synthesis of novel ion-conducting mat's for fuel cell applicator (10+5')
- Tamar Khatisashvili, Elene Gabodze – Green Chemistry (10+5')

**16:00 – 16:30 Department of Biology**

- Nato Kuljanishvili – In vitro testing of in silico designed cationic antimicrobial peptides (20)
- Eka Kelenjeridze – Metabolic Characteristics of the Archaea (10+5')

18:00 Arrival at Hotel

19<sup>30</sup> **Social program** (Banquet of the Workshop, „Kopala“ restaurant)

August 24, Friday (School Part at TSU) 9<sup>30</sup> – 18<sup>00</sup>

### Presentations by students

#### Students session 1 (auditorium 107): Convener – Ramaz Botchorishvili (09:30 – 11:00)

*Introductory information* – “How to prepare presentations ?” (Hans Ströher) (10')

- Giga Aptsiarui, Salome Shekiladze – Processing measurements using deep learning (10')
- Salome Kakhaia, Mariam Razmadze – Shape parameter for radial basis functions (10')
- Tamaz Sepiashvili, Mari Jananashvili – Coupled Horn-Shunk & Lucas-Kannade for images 10'
- Giorgi Svanadze, David Jokhadze – Vehicle type, quantity and velocity from video (10')
- Pavle Tsotskolauri – The First Measurements at Station Locations (10')

11:00 – 11:30 Coffee break

#### Students session 2 (auditorium 107): Convener – Bezhan Chankvetadze (11:30 – 13:00)

- Tamar Khatiaishvili – Nitrous oxides pollution in Tbilisi (10')
- Lasha Giunashvili – Carbon monoxide and dioxide pollution in Tbilisi (10')
- Salome Pantsulaia – Methane pollution in Tbilisi (10')
- Nana Khundadze – Contamination gradients for air pollutants in space (10')
- Mariam Maisuradze – Contamination gradients for air pollutants in time (10')
- Natia Porchkhidze (ISU) – GCR and climate change (10')

13:00 – 14:15 Lunch break

#### Students session 3 (auditorium 107): Convener – David Mchedlishvili (14:15 – 15:30)

- Tamar Zakareishvili – Studies of ATLAS hadronic calorimeter response (10')
- Gogita Papalashvili – Neutrino research at intermediate energies with KM3NeT/ORCA
- Revaz Beradze – Physics beyond SM and precision tests of the neutron beta-decay (10')
- Alexandre Gurchumelia – Physical applications of the non-compact G2 (10')
- Mariam Chitishvili – Study of metastable vacuum decay with gravity (10')
- Goga Suknidze – Axion search experiments (10')
- Lado Razmadze – title ? (10')
- Sopiko Kurdadze (ISU) – Rock lizards-Gene flow and hybridization within species of „mixtra“(10)

#### Students session 4 (auditorium 107): Convener – Ketevan Kotetishvili (15:30 – 16:40)

- Tatia Gonashvili (GTU) – Radiotherapy techniques (10')
- Natia Beriashvili (GTU) – Medical imaging technologies (10')
- Richard Kibler (GTU) – PET/MRI (10')
- Davit Sebuia, Elene Lortkipanidze (GTU) – Radiation therapy (10')
- Lazare Kvirtia (GTU) – M1 Abrams (10')
- Zurab Saralidze (GTU) – Nuclear process in medicine (10')
- Lika Sichinava (GTU) – Detectors, elementary particles (10')

16:45 – 17:00 Coffee break

- Summarizing the students presentations (17:00 – 17:30)
- Certificates & Internships (awarding ceremony for students) (17:30 – 18:00)
- Concluding remarks

18<sup>00</sup> End of Workshop