

GGSB 2026: A Student and Collaboration Workshop

"Science at Existing and Planned SMART|Labs in Georgia"

(Venue: Tbilisi, Date: September 7 – 12, 2026)

Sunday, September 6: Arrival/Accommodation/Reception (at Hotel Orion)

Monday, September 7 (AUG/FUT, auditorium #220)

(Participants: Invited lecturers from FZJ, GSI, HZDR, Georgian Scientists / Students)

Opening Session: Welcome & Opening Remarks [11:00 – 11:15]

Vakhtang Lejava (Rector of AUG/FUT)

Nino Doborjginidze (Rector of ISU)

Sebastian Schmidt (Scientific Director of HZDR, GGSB President)

Session 1: GGSB 2026 Kick-off meeting [Convener: Vakhtang Lejava]
[11:15 – 12:15]

Vakhtang Lejava (AUG/FUT)

Introductory overview to AUG/FUT and role of GGSB

Zaza Metreveli (AUG)

GGSB Collaboration: History, Format of the Meeting / Agenda

Sebastian Schmidt (HZDR)

Grand Challenges at HZDR

Lunch break (AUG cafeteria & group photo) [12:15– 13:30]

Session 2: Science at the Multidisciplinary SMART|Lab's [Convener: Zaza Metreveli]
[13:30 – 16:00]

Ghaleb Natour (FZJ)

The Key To Success: How SMART_Lab enable a thriving Science Bridge

Bernd Neumaier (FZJ)

SMART|Biomarker_Lab: Bridging Diagnostics and Therapy

Nadiya Zhutova (HZDR)

Medical Radionuclide Production at HZDR

Jon Shah (FZJ)

SMART|Biomedical Imaging_Lab: ML/AI Based Imaging Methods in Neuroscience

David Arutinov (FZJ)

Current status and further plans for Digital SMART_Lab

Robert Wegener (FZJ)

Current status and perspectives of the SMART|

AtmoSim_Lab: Contributions in the EU project Net4Cites

Matthias Meier-Grüll (FZJ)

Double Harvest from the Fields: Potential and Challenges of Agrivoltaics

Welcome Dinner: (address...) [19:00 – 21:00]

Tuesday, September 8 (Parallel Sessions at AUG/FUT)

Wednesday, September 9 (Parallel Sessions at AUG/FUT, ISU, TSU)

Thursday, September 10 (Parallel Sessions at AUG/FUT, TSU)

Friday, September 11 (Closing Session at ISU)

Parallel Sessions topics-wise (at different universities)

Self-organized (free format) by the (local) university responsible persons:

AUG: Zaza Metreveli

TSU: Giorgi Jibuti

ISU: Elene Zhuravleva

GTU: Mikheil Chikhradze

Friday, September 11 (Closing session at ISU (Building G), auditorium #106)

- GGSB 2026 Summary & Outlook -

Welcome & Opening Remarks [11:00 – 11:30]

Nino Doborjginidze (Rector of ISU)

Elene Zhuravleva (Dean at ISU)

“Overview of the programs at ISU and role of GGSB”

Scientific presentations [11:30 – 13:30]

- Davit Tarkhnishvili (ISU):
"Cultivating Future Scientists: Integrating Research into Academic Learning at ISU"
- Giorgi Mamatsashvili (HZDR):
"GGSB Cooperation in the Field of Astrophysical Fluid Dynamics"
- Giorgi Dalakishvili (ISU):
"Numerical Assessment of Alfvén Waves Influence on the Atmospheric Irregular Structures"
- Nika Chakunashvili (Master student, ISU):
"Molecular Dynamics Study of G-Quadruplex Structural Recognition"

Lunch break (group photo) [13:30– 14:30]

Concluding remarks [15:00 – 16:00]

Giorgi Mamatsashvili (HZDR), Irakli Keshelashvili (GSI), Bernd Neumaier (FZJ)

Saturday, September 12 (Social program)

- Free day for individual excursions in & around Tbilisi / Leaving to Germany
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Tuesday, September 8 (AUG/FUT, auditorium #?)

Parallel Session: Engineering Topics (Electro) [Conveners: Zaza Metreveli / David Arutinov]
[11:00 – 13:30]

David Arutinov (FZJ)

"Electronics Development at Jülich"

Rati Chketia (AUG/FZJ)

"Development of a Scalable Multi-Channel GPR Tomography System: Transmit Waveform and Antenna Optimization"

Tamaz Mukeria (AUG/FZJ)

"Development of a Scalable Multi-Channel GPR Tomography System: Antenna Array Characterization and Crosstalk Analysis"

Elguja Abuladze (with Ilja, AUG/FZJ)

"Design and FPGA Implementation of a Real-Time Quantized Neural Network for Newtonian Noise Mitigation Demonstrator"

Giorgi Jgharkava (with Chimezie, AUG/FZJ)

"Neural Network data transfer in embedded environment"

Giorgi Purtskhvanidze, Giorgi Tsiklauri (Bachelor, ISU)

"Inter-Microcontroller Low-Cost Phase-Modulated RF Link"

Giorgi Archiaia, Giorgi Kharatishvili (Bachelor, ISU)

"An FPGA-Based Frame-Buffered Bridge from MIPI CSI-2 to SPI for Low-Speed Microcontrollers"

Lunch break (AUG cafeteria) [13:30– 14:30]

Parallel Session: Engineering Topics (Electro): Continuation ... [14:30 – 17:00]

Nikoloz Kalichava (with Mchedlishvili) (AUG)

"Research and Experimental Evaluation of a Power Supply System for SiPM Detectors"

Mikheil Kalantarovi (with Mchedlishvili) (AUG)

"Design of Thermostatic Chambers"

Salome Tvauri (with Mchedlishvili) (AUG)

"Designing a Low-Dropout Regulator for higher voltage SiPMs"

Mariam Titilokashvili (with Mchedlishvili) (AUG)

"Portable data acquisition system for SiPM-based particle detectors"

Zurab Kukhaleishvili (with Anasovi) (AUG)

"Audio processor"

Nikoloz Kurdgelashvili (with Anasovi) (AUG)

"Determining the movement of an object using IMU (inertial measurement unit) sensors"

Elene Chanturia (with Anasovi) (AUG)

"Cardiograph"

Wednesday, September 9 (AUG/FUT, auditorium #?)

Parallel Session: Engineering Topics (Electro/AUG) [Conveners: Metreveli Z / Arutinov D]

[11:00 – 13:30]

➔ **Start with the introductory tour to the Electronics Lab** (Akaki Pagava)

Rati Gogichashvili (with Pagava) (AUG)

"Design and Implementation of Real-Time Control for Autonomous Line-Tracking Robots"

Nana Gogberashvili, Nata Siradze, Givi Chachava (with Apakidze) (AUG)

"A microcontroller-based universal laboratory platform for science education"

Giorgi Maisuradze (Master's student) (AUG)

"Design and Evaluation of a Wireless Power Link for Low-Power Biomedical Implantable Devices"

Giorgi Khmaladze (Master's student) (AUG)

"Temperature monitoring of industrial and non-industrial equipment with a thermal camera"

Lunch break (AUG cafeteria) [13:30– 14:30]

Parallel Session: Engineering Topics (Electro/FUT): Continuation... [Convener: Metreveli Z]

[14:30 – 16:30]

Zaheer Abbas/Jon Shah (FZJ)

"Introductory talk to the field of "ML/AI Based Imaging Methods"

Natalia Petremghvdlishvili (FUT)

"Biomedical hardware modelling of a human cardiac cell and real-time simulation of ionic currents"

Ana Kakhniashvili, Anastasia Chikovani (FUT)

"AI Assisted EEG-Based Brain-Computer Interface"

Nika Durishvili, Tengiz Gvelesiani (FUT)

"Single-element Mechanical Ultrasound Scanner"

Georgios Konstantinos Lipiridis (FUT)

"Bipedal Robot with Machine Learning"

Giorgi Lekvinadze (FUT)

"3D Spatial Scanning Using a Rotating 2D LiDAR Sensor "

Tini Giorgadze (FUT)

"TOONEY - Digital Sound Processor"

Giorgi Mandzulashvili (FUT)

"FPGA-Based VPN System with Hardware-Accelerated AES Encryption and DMA Control"

Gabriel Gogishvili (FUT)

"STM: Scanning Tunnelling Microscope"

Dimitri Iobashvili, Tornike Kutaladze (FUT)

"6-DOF Stewart Platform Motion System"

Coffee break (AUG cafeteria) [16:30– 17:00]

Parallel Session: Engineering Topics (Electro/FUT): *Continuation* ... [17:00 – 18:00]

Georgios Konstantinos Lipiridis (FUT)

"Bipedal Robot with Machine Learning"

Saba Prangulashvili (FUT)

"FPGA Implementation of a RISC-V Processor and Custom OS Development"

Luka Khabeishvili (FUT)

"Power performance analysis of a Pipelined 8-bit RISC-V inspired processor"

Giorgi Lekvinadze (FUT)

"3D Spatial Scanning Using a Rotating 2D LiDAR Senso

Thursday, September 10 (AUG/FUT, auditorium #?)

Parallel Session: Mechanical Engineering [Conveners: Harald G / Zaza M / Mamuka B]
[11:00 – 17:00]

Giorgi Kakabadze (AUG/FZJ)

"Introductory talk to the field of PhD topic: "Minimization of thermo-mechanical influences on the image quality of satellite optical systems"

Otar Kemularia (AUG)

"Automated Design of Light Jet-Powered UAVs"

Ioane Maisaia (AUG)

"Optionally Piloted Hypersonic Aerospace Vehicle With Inflight Hydrogen Generation Propulsions"

Lizi Tabukashvili (with Michael Saunders) (FUT)

"AI-Driven Model Predictive Control (MPC) for Grid-Interactive HVAC Systems: Mitigating Peak Energy Demand Under Future Climate Change in Georgia"

Davit Nemsadze (with Michael Saunders) (FUT)

"Vibration-Based Structural Health Monitoring for Early Fault Detection in Rotating Machinery"

Temur Makharadze (AUG)

"Propulsion and Attitude Control of a Miniaturized Autonomous Inspection Vehicle for Low-Earth Orbit Applications"

Sandro Khvedeliani (AUG)

"Design and Development of a 6-DOF Articulated Manipulator for Multi-Task Capability"

Oliko Chighladze (AUG)

"Passenger safety system for subway tracks"

Zurab Turabelidze (AUG)

"Design a height kinetic energy weapon for combat robotics"

Lunch break (AUG cafeteria) [13:30– 14:30]

Interview Session: Engineering (Electro and Mechanical) [Conveners: Ghaleb N / Zaza M]
[14:30 – 17:00]

- *This special session will be devoted to the selected students based on their presentations during the parallel sessions on the Engineering topics. Candidates can be considered for an Internship or Master / PhD thesis work at FZJ.*

Tuesday, September 8 (AUG/FUT, auditorium #?)

Parallel Session: Chemistry Topics [Conveners: Giorgi Titvinidze / Bernd Neumaier]
[11:00 – 13:30]

Giorgi Titvinidze (AUG)

"Introductory talk about the chemistry projects at AUG"

Bernd Neumaier / David Gabadadze (FZJ)

"Introduction to Nuclear Medicine"

Sandra Kapanadze (with Titvinidze) (AUG)

"Balancing Mechanical Properties and Chemical Stability in Sulfonated Poly(Phenylene Sulfone)s"

Elene Lezhava (with Titvinidze) (AUG)

"sPPS/PBI-O Blends as Polymer Electrolytes: The "Snake-in-a-Cage" Effect"

Davit Karichashvili (with Titvinidze) (AUG)

"Overcoming Challenges: One-Step Synthesis of Microblock sPPS and Crosslinking"

Vika Dzandzava (with Elizbarashvili) (AUG)

"Experimental Study of Quercetin Nitration"

Ana Labadze (with Goletiani) (AUG)

"Amnion Extract as a therapeutic strategy in an In vivo model of early-stage Alzheimer's disease"

➔ End with the guided tour to the Chemistry Lab's (Giorgi Titvinidze)

Lunch break (AUG cafeteria) [13:30– 14:30]

Tuesday, September 8 (AUG/FUT, auditorium (in chemistry session) #?)

Parallel Session: Physics Topics

[Conveners: Vazha Berezhiani / Irakli Keshelashvili]
[14:30 – 17:30]

Vazha Berezhiani (FUT)

"Introductory remarks ..."

Irakli Keshelashvili (GSI/FAIR)

"Introductory talk: FAIR project at GSI - CBM Experiment "

Pavle Erikashvili (with Macharashvili) (AUG)

"Nuclear Reactor Dynamics Simulation Using FPGA "

Irakli Ugulava (with Berezhiani) (FUT)

"Radiation Reaction Effect on the Degenerate Plasma Dynamics"

Andria Manjavidze (with Berezhiani) (FUT)

"Vortex Solitons and Filamentation of Electromagnetic Beams in Complex Media"

Saba Kalandarishvili, Luka Megrelidze (ISU) (with Jorjadze) (FUT)

"Witten's Black Hole model: Symmetries and Integrability"

Nikoloz Zagaidze, Luka Megrelidze (ISU) (with Jorjadze) (FUT)

"Witten's Black Hole model: Scatterings for homogeneous configurations"

Tuesday, September 8 (AUG/FUT, auditorium #?)

Parallel Session: Plant Production Topics

[Conveners: Teo Urushadze / Matthias Meier]
[11:00 – 13:30]

Teo Urushadze (Dean at AUG)

"Introduction ... about the Agricultural science topics at AUG"

Erekle Chakhvashvili (FZJ)

"Hidden Canopies: Potential of UAVs in Agrivoltaic Research"

Mariam Gviniashvili (AUG)

"Climate-Resilient Urban Landscapes: Integrating Drought-Tolerant Ornamental Plants and Sustainable Soil-Water Management".

Rati Peikrishvili (AUG)

"The Role of Shade Nets in Cabbage Production"

Koba Donadze (AUG)

"Hazelnuts in Georgia: Biodiversity, Economic Importance, and Prospects"

Levan Chaganava (AUG)

"Influence of fertilization on fruit development, flowering and maturity timing in tomato under field conditions"

Lunch break (AUG cafeteria) [13:30– 14:30]

Parallel Session: Plant Production Topics *Continuation* ...

[14:30 – 17:00]

Ketevan Batsatsashvili (ISU)

"Initial Application of Ellenberg Indicator Values to the Flora of Georgia"

Vasil Metreveli (ISU)

"Wood Density Variation across Georgian Forests: Species Differences and Environmental and Stand-Structural Controls"

Roland Bol (FZJ)

"Seabird Bearing Light"

Tamar Jolokhava (ISU)

"Summary of Published Research: Exploring Altitudinal Variations in Soil and Vegetation within the Alpine Desert of the Central Greater Caucasus, Georgia" (ISU);

Zhana Mosidze (B.Sc. Student, ISU)

"Entomopathogenic Nematodes of Georgia: Biodiversity, Biocontrol Potential, and Modern Research"

Kato Melikidze (B.Sc. Student, ISU)

"Integrating Plant Biomonitoring and Low-Cost Air Quality Monitoring for Particulate Matter Assessment in Georgia"

Wednesday, September 9 (TSU-II, Chavchavadze ave 3 / auditorium #346)

Parallel Session: Atmospheric Research Topics

Conveners: [G. Jibuti / Robert Wegener]

[11:00 – 17:00]

Giorgi Jibuti (TSU SMART|Atmo_Lab)

Introductory remarks

Robert Wegener (FZJ)

Introductory talk on the "Study of climate system processes and air quality at FZJ"

Luka Menabde (TSU)

"Particulate matter contamination measurement in Tbilisi using traditional instruments and modern budget friendly sensors"

Saba Jorbenadze (Ph.D. Student, TSU)

"The Potential of Capillary Electrophoresis–Tandem Mass Spectrometry (CE–MS/MS) in the Forensic Toxicology Analysis of Various Psychoactive Substances and Their Phase I and Phase II Metabolites in Human Biological Fluids"

Natia Tchanturia (2-nd Year Ph.D. Student, TSU)

"On the Track to Sensing Single-Neutron-Difference-Based Molecular Chirality"

Ina Pipia (3-rd Year B.Sc. Student, TSU)

"Role of Formic Acid in the Enantioseparation of New Chiral Telluronium Complexes Using High-Performance Liquid Chromatography"

Vazha Tkemaladze (B. Sc. Graduate, TSU)

"Investigation of Dipipanone and Its Metabolites Using High-Performance Liquid Chromatography Coupled with Tandem Mass Spectrometry"

Ana Gabedava (4-th Year B.Sc. Student, TSU)

"Environmental Quality Assessment of Soils and Waters Through Heavy Metal Analysis Using MP-AES: A Case Study from Selected Areas of Western Georgia"

Lunch break (place at TSU) [13:30– 14:30]

Ana Kuntchulia (3-rd Year B. Sc. Student, TSU)

"Separation of Deuterated Isotopologues by Capillary Electrophoresis"

Nikoloz Gonitashvili (3-rd Year B. Sc. Student, TSU)

"First Baseline Separation of Isotopomers by Capillary Electrophoresis"

Nini Ukhurgunashvili (3-rd Year B. Sc. Student, TSU)

"Use of α -, β -, and γ -Cyclodextrins for the Enantiomeric and Isotopologue Separation of Psychoactive Compounds by Capillary Electrophoresis"

Irakli Apriamashvili (3-rd Year B. Sc. Student, TSU)

"Application of Modified Cyclodextrin Derivatives for the Recognition of Enantiomers, Isotopologues, and Isotopomers of Psychoactive Compounds in Capillary Electrophoresis"

Mariami Kereselidze (4-th Year B. Sc. Student, TSU)

"Validation of a Dual Chiral Selector CE–MS/MS Method for Enantioselective Analysis and Pharmacokinetic Investigation of MDMA and Its Metabolites in Biological Samples"

Mariam Shubitidze (4-th Year B. Sc. Student, TSU)

"Application of a Dual Chiral Selector CE–MS/MS Method to Forensic Toxicological Analysis of MDMA and Its Metabolites"

Kato Melikidze (Bachelor, ISU)

"Integrating Low-Cost Air Quality Monitoring for Particulate Matter Assessment in Georgia"

Wednesday, September 9 (TSU Physics Inst., Tamarashvili 6 / SMART|EDM_Lab)

Parallel Session: Applied Physics Topics /Exp. Dev. Medicine [Conveners: David M, Andro K]
[11:00 – 15:00]

Huagen Xu (GSI/FAIR)

"Introductory talk: Example of Experiments at GSI/FAIR and CERN "

Otari Javakhishvili (Prague Uni)

"Introductory talk: "Electronics Development for the CBM (Forward Spectator) Detector"

Dachi Okropiridze (GSI/FAIR)

"Introductory talk: Applied Detector Physics (PhD topic examples)"

David Mchedlishvili (TSU)

"Introductory talk: Experimental Development for Medicine (recent measurements at INM5/FZJ)"

Coffee break (in the Lab) [12:30– 13:00]

Students presentations:

Luka Tsulukidze (M.Sc. Graduate, TSU)

"The topic of Master thesis performed during 6 months (2026) stay at HZDR"

Nikoloz Kalichava (with Mchedlishvili) (AUG)

"Research and Experimental Evaluation of a Power Supply System for SiPM Detectors"

Mikheil Kalantarovi (with Mchedlishvili) (AUG)

"Design of Thermostatic Chambers"

Salome Tvauri (with Mchedlishvili) (AUG)

"Designing a Low-Dropout Regulator for higher voltage SiPMs"

Mariam Titlokashvili (with Mchedlishvili) (AUG)

"Portable data acquisition system for SiPM-based particle detectors"

Leila Cherkezishvili (with Mchedlishvili) (TSU)

"Determining the probability of dimuonic decay of $\psi(2S)$ from ATLAS data"

Rusudan Kvesitadze (with Mchedlishvili) (TSU, UG)

"Detection of Muons Produced by Ultrashort High-Intensity Laser"

Thursday, September 10 (TSU-II, Chavchavadze ave 3 / auditorium #346)

Parallel Session: Chemistry Topics [Conveners: Rusudan Kakava / Bernd Neumaier]
[10:00 – 15:00]

Rusudan Kakava (TSU)

Introductory remarks

Bernd Neumaier / David Gabadadze (FZJ / TSU)

“The Development of Novel Biomarkers for Nuclear Medicine”

Students presentations:

Nutsa Shermadini (M.Sc. Graduate, TSU)

“Enantioselective Analysis of 4-Methylmethcathinone and Its Phase I Metabolites Using Capillary Electrophoresis–Tandem Mass Spectrometry (CE-MS/MS)”

Barbare Kavtaradze (4-th Year B. Sc. Student, TSU)

“Development and Optimization of a Dual Chiral Selector CE–MS/MS Method for Enantioselective Analysis of MDMA and Its Metabolites”

Gabriel Sarishvili (B. Sc. Graduate, TSU)

“Asymmetric Synthesis of Chiral Sulfoxides by Enantioselective Oxidation of Prochiral Sulfides”

Tika Pipia (4-th Year B.Sc. Student, TSU)

“Enantioseparation of New Chiral Telluronium Complexes Using High-Performance Liquid Chromatography (HPLC)”

Ketevan Akhalkatsi (4-th Year B. Sc. Student, TSU)

“Separation of Enantiomers of Some Chiral Drugs Using Cyclodextrins by Capillary Electrophoresis”

Ekaterina Romanenko (B. Sc. Graduate, TSU)

“Biowaste-Derived Activated Carbon–Nickel Composites for H₂ Generation”