



Current situation and competences at Particle Physics/Accelerator Technology study subjects

FJODOR SERGEJEV

PhD, Associate Professor

School of Engineering

09.07.2018

Presentation outline

- R&D activities, competences
- Study programmes
- Cooperation, internships
- Subjects

The logo features the text 'TTU' in a bold, maroon, sans-serif font, followed by a maroon chevron pointing to the right. To the right of the chevron is the number '100' in a bold, black, sans-serif font. Two diagonal lines intersect at the center of the logo: a maroon line running from the top-left to the bottom-right, and a black line running from the top-right to the bottom-left.

TTU **100**

**R&D activities,
competences**

R&D activities, competences

Competences in Science

Department of Cybernetics

- Wave Engineering Laboratory
- Laboratory of Systems Biology
- Semiconductor Physics
- Theoretical Physics
- Mathematical Analysis
- Group and Semigroup Theory
- Inverse Problems and Stochastic Methods
- Rheology of Composites
- Photoelasticity
- Nonlinear Wave Dynamics

R&D activities, competences

Competences in Materials Science

Semiconductor Materials Technology:

- Development of low-cost absorber materials for photovoltaics
- Development of low-cost technologies for photovoltaics
- Studies of optoelectronic properties

R&D activities, competences

Competences in ICT

Centre for Dependable Computing Systems:

- Design, reliability, verification and testing of nanoelectronic systems (including multi-/many-core systems)
- Aging and rejuvenation in nanometer technologies
- Hardware security in on-chip networks
- Dependability, test and fault management for many-core systems
- Many-core based mixed criticality systems
- Hardware/software co-simulation of cyber-physical systems
- Embedded test instruments for digital systems
- Algorithms, sensors and signal processing in biomedical applications
- Diagnostic test generation and microprocessor testing
- Multi-aspect verification of computing systems

R&D activities, competences

Competences in ICT

Centre for Intelligent Systems:

- Control of complex nonlinear systems;
- Self-learning and adaptation methods in control systems;
- Computational Intelligence Algorithms - Artificial Neural Networks, Genetic Algorithms, Fuzzy Logic;
- Fractional-order modeling and control;
- Distributed Control Systems;
- Data analysis;
- Microcontrollers and design of electronic systems;
- Virtual Reality

R&D activities

Competences in ICT and mechatronic, robotics

Centre for Biorobotics:

- Biology-inspired robotic systems
- Underwater Robotics
- Fishfriendly Technologies for Hydropower
- Large Scale Hydrodynamic Imaging
- Fish Locomotion and Sensing
- Robotic Surgery

Mechatronics and Autonomous Systems Centre

- Control of smart machines
- Smart sensing systems
- Robotic systems for production and service automation

The logo features the text 'TTU' in a bold, maroon, sans-serif font, followed by a maroon chevron pointing to the right. To the right of the chevron is the number '100' in a bold, black, sans-serif font. Two diagonal lines, one maroon and one black, intersect at the center of the 'TTU' and '100' text. The maroon line runs from the top-left to the bottom-right, and the black line runs from the top-right to the bottom-left.

TTU > **100**

Study programmes

Study programmes

- **Unit responsible:** School of Science
- **Bachelor study** (in Estonian):
YAFB02/17 Applied Physics,
study programme manager Raavo Josepson
- **Specialities:** oceanography and meteorology;
applied physics
- **Degree awarded:** Bachelor of Science in
Engineering
- **More information:** <https://ttu.ee/?id=16705>
(only in Estonian)

Study programmes

- **Unit responsible:** School of Science
- **Master study** (in English):
YAFM02/18 Applied Physics,
study programme manager Raavo Josepson
- **Specialities:** physics and mathematics;
oceanography and meteorology
- **Degree awarded:** Master of Science in
Engineering (applied physics)
- **Pre-Requisites:** Bachelor's degree or
equivalent in natural sciences or technical
sciences (material science, environmental
mechanics, engineering mathematics)
- **More information:** <https://ttu.ee/?id=130890>

Study programmes

- **Unit responsible:** School of Science
- **Doctoral study** (in English):
YAFM02/18 Applied Physics,
study programme manager Olle Hints
- **Specialities:** applied physics; applied mathematics; applied mechanics; biomedical engineering and medical physics; geology; geotechnology; oceanography and meteorology
- **Degree awarded:** Doctor of Philosophy (biomedical engineering and medical physics, geology, geotechnology, oceanography and meteorology, applied physics, applied mathematics, applied mechanics)
- **More information:**
<https://ttu.ee/studying/phd-studies/research-fields/>

The logo features the text 'TTU' in a bold, maroon, sans-serif font, followed by a maroon chevron pointing to the right. To the right of the chevron is the number '100' in a bold, black, sans-serif font. Two diagonal lines, one maroon and one black, intersect at the center of the 'TTU' and '100' text. The maroon line runs from the top-left to the bottom-right, and the black line runs from the top-right to the bottom-left.

TTU **100**

**Cooperation, internships,
graduation theses**

Cooperation, internships, , graduation thesises

- **Cooperation (internal):**
- Mechanical and Industrial Engineering, Robotics and Mechatronics
- Information Technologies, Software Science and Computer Systems, Cybernetics
- Materials Science and Materials Engineering
- Electronics and Electrical Power Engineering
- Health Technologies
- Innovation and Business Centre Mektory

Cooperation, internships, graduation thesises

- **Cooperation (external):**
- **Universities:** University of Tartu, National Institute of Chemical Physics and Biophysics and others
- **Numerous Estonian enterprises** as R&D partners (Estonian ICT cluster, ELIKO competence centre, NPM SILMET AS, Sirius Microwave OÜ, Liewenthal Electronics, Skeleton Technologies and many others)
- **International collaboration:** European Spallation Source (ESS), European Space Agency (ESA), H2020 and many other projects and actions

Cooperation, internships, graduation thesises

- **Internships and graduation thesises:** Applied Physics
- **Some examples of topics:**

Topic	Suitable For	Contact
Astro-particle physics	Curricula: Applied Physics <ul style="list-style-type: none"> • practical works of bachelor and master students • graduation thesis of bachelor and master students 	Andi Hektor (andi.hektor@cern.ch)
THz spectroscopy of materials	Curricula: Applied Physics <ul style="list-style-type: none"> • practical works of bachelor and master students • graduation thesis of bachelor and master students 	Toomas Rõõm (toomas.room@kbfi.ee) Urmas Nagel (urmas.nagel@kbfi.ee)
TTÜ satellite orbital mission planning	Curricula: Applied Physics <ul style="list-style-type: none"> • graduation thesis of bachelor and master students 	Vladislav-Veniamin Pustõnski (vlad.pustynski@gmail.com)

- **More information:**
<https://www.ttu.ee/faculties/school-of-science/studies-35/internshipgraduation-thesises/>

The image features a large, thin 'X' shape that divides the page into four quadrants. The top-left and bottom-right quadrants are filled with a light purple color, while the top-right and bottom-left quadrants are white. The 'X' is formed by two intersecting lines: a dark purple line and a black line. In the center of the 'X', the text 'TTU' is written in a bold, dark purple, sans-serif font. To the right of 'TTU' is a large, black, sans-serif number '100'.

TTU 100

Subjects

Subjects

- **YFX1180 Quatum Mechanics**
- **YFX1120 Solid State and Semiconductor Physics**
- **YFX1130 Introduction to particle physics**
- **YFX1110 Practical Spectroscopy**

All information in OIS (Information Study System, www.ois2.ttu.ee)

The logo features the text 'TTU' in a bold, maroon, sans-serif font, followed by a maroon right-pointing chevron. To the right of the chevron is the number '100' in a large, bold, black, sans-serif font. The entire logo is set against a background of four diagonal lines: a maroon line from the top-left to the bottom-right, a black line from the top-right to the bottom-left, and two lighter maroon lines forming an 'X' shape that intersect at the center of the logo.

TTU 100

Fjodor Sergejev

TALLINN UNIVERSITY
OF TECHNOLOGY

Ehitajate street 5,
19086 Tallinn, Estonia

Phone +372 620 3346

fjodor.sergejev@ttu.ee