

I. Institution

1. Institution's name	Petrozavodsk State University
2. Faculty (department)	Faculty of Physical Engineering
3. Postal address E-mail Web – Homepage	Anokhina street 20 Office 403 Petrozavodsk 185640 Russia
4. Contact person/coordinator (name, phone, e-mail, position)	Ms. Natalia Piantina Head of the department of educational and exchange programs exchange.office@karelia.ru +7 8142 71 10 88

II. Course's profile

5. Course title	Electric and Magnetic Duality in Electrodynamics and Gravity
6. Course profile (please give some key words to specify the focus)	Electric and Magnetic Duality, Maxwellian theory with Charges and currents, Duality Symmetry and Instantons, Nonabelian case.
7. ECTS points available? (Yes/No)	No
8. Class hours/week	20 hours per week
9. Integrated Russian language course for beginners (Yes/No, hours/week)	No
10. Language of instruction	English
11. Integrated practical training/ research program (Yes/No, brief description)	No.
12. Integrated cultural program: excursions etc. (Yes/No, brief description)	Yes, That is the optional program. It will let students to know more about Russian culture and history. <ul style="list-style-type: none">• tour of Petrozavodsk (2 hours)• excursion to Kizhi island – open air museum of wooden architecture• excursion tour to the first sanatorium in Russia “Martial waters” and the biggest waterfall in the flat part of Europe.• visiting of city Sortavala and monastery on the island Valaam.• visiting the most rapidly developing city of Karelia Kondopoga.• 2 day trip to St. Petersburg The cost of cultural program is 360 euro.
13. Number of students (min-max)	10
14. Tuition fees (/ month / person)	125 euro
15. Course's duration	1 month

III. Accommodation

17. Accommodation conditions: student hostel (description of accommodation facilities, incl./excl. food, costs (/ month / person)	Student hostel. Conditions: the room is shared by 2 students. The toilet and shower are on the floor. The cost excl. food is 40 euro.
18. Accommodation conditions: guest family (optional): Yes/No, incl./excl. food, costs (/ month / person)	Guest family. Conditions: a separate room, access to all facilities (kitchen, bathroom, TV set, refrigerator, telephone etc.), bedroom clothing. The cost excl. food is 60 euro per month/ incl. food 150 euro.

Additional description of the course

The structure of the course:

1. lectures
2. workshops

Description of the course:

Electric and Magnetic Duality in the Maxwellian theory with Charges and currents. Dirac's monopole. Duality symmetry in the Maxwellian Electrodynamics without sources.

Noninvariance of the Lagrangian under the Duality Transformations. Nonlinear, Duality Symmetric, Pure (with no sources) Electrodynamics. Nonabelian case. Instantons.

Transition to the Maxwell theory. Electric and Magnetic Duality in High Energy Physics. Montonen-Olive's conjecture. Electric and Magnetic Duality in Gravitation. Duality Symmetric Gravity as an extension of Einstein's theory. Duality Symmetry and Instantons.

Topics for discussion at the workshops:

1. Nonlinear duality-symmetric Electrodynamics and its relation to Maxwellian Electrodynamics
2. Duality-symmetric Gravity and its relation to Einstein's theory
3. Schwarzschild' solution and Cosmology

Requirements:

Students wishing to participate must have completed at least two years of studies in the field of physics, theoretical physics, nuclear physics.



