



National Research University Higher School of Economics (HSE)

Curriculum

Field of study 03.04.02 Physics

Educational Programme "Physics"

Trajectories: "Condensed Matter Physics", "Physics and Technology of Nanostructures", "Quantum Field Theory"

Implementing unit: St. Petersburg School of Mathematics, Physics and Computer Science, HSE, HSE - Saint Petersburg

1 st, 2022/2023 academic year

APPROVED

20.05.2022

Vice Rector

ROSHCHIN S.Y.

Signed with EDS

Length of Programme: 2 years

Years of Study: 2022/2023 - 2023/2024

Mode of Study: Full Time

Degree: Master's degree / MBA

| Block Code | Course | Subject type | Department | Credits | Total Academic Hours | Contact Hours | Allocation of Contact Hours | | | | Additional Information |
|----------------------------------------------|----------------------------------------------------------------|--------------|------------------------------------------------------------|--------------|----------------------|---------------|-----------------------------|-----------|-----------|-----------|------------------------|
| | | | | | | | 1 | 2 | 3 | 4 | |
| Degree Programme | | | | 60,00 | 2 280 | 290 | 70 | 64 | 80 | 76 | |
| Quantum Field Theory (Research track) | | | | 60,00 | 2 280 | 290 | 70 | 66 | 96 | 92 | |
| Major | | | | 30,00 | 1 140 | 244 | 68 | 64 | 76 | 70 | |
| Major (5 из 6) | | | | 30,00 | 1 140 | 244 | 68 | 62 | 60 | 54 | |
| 1 | Introduction to Nanophotonics | E | Department of Physics (at HSE University in St.Petersburg) | 6,00 | 228 | 74 | | | 38A | 36A | |
| 2 | Integrable Systems 1 | E | Department of Physics (at HSE University in St.Petersburg) | 6,00 | 228 | 26 | 14 | 12A | | | |
| 3 | Gauge Theory | E | Department of Physics (at HSE University in St.Petersburg) | 6,00 | 228 | 34 | | | 18 | 16A | |
| 4 | Quantum Electrodynamics | E | Department of Physics (at HSE University in St.Petersburg) | 6,00 | 228 | 80 | 40A | 40A | | | |
| 5 | Methods of Quantum Field Theory in Condensed Matter Physics | E | Department of Physics (at HSE University in St.Petersburg) | 6,00 | 228 | 38 | | | 20 | 18A | |
| 6 | Modeling of Quantum Systems | E | Department of Physics (at HSE University in St.Petersburg) | 6,00 | 228 | 26 | 14 | 12A | | | Online Course |
| Key Seminars | | | | 9,00 | 342 | 42 | 2 | 2 | 20 | 18 | |
| 1 | Research Seminar "Additional Chapters of Quantum Field Theory" | C | Department of Physics (at HSE University in St.Petersburg) | 6,00 | 228 | 34 | | | 18 | 16A | |

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|---|------------------------------------------------------------------|---|------------------------------------------------------------|--------------|--------------|------------|-----------|-----------|------------|------------|---------------|
| 2 | Mentor's Seminar | C | Department of Physics (at HSE University in St.Petersburg) | 3,00 | 114 | 8 | 2 | 2A | 2 | 2A | |
| | Magolego | | | 6,00 | 228 | | | | | | |
| 1 | Дисциплины по выбору из общеуниверситетского пула | E | | 6,00 | 228 | | | | | | |
| | Internship | | | 15,00 | 570 | 4 | | | | 4 | |
| | Research Internship | | | 12,00 | 456 | 2 | | | | 2 | |
| 1 | Research Internship | C | | 12,00 | 456 | 2 | | | | 2A | |
| | Project Internship | | | 3,00 | 114 | 2 | | | | 2 | |
| 1 | Projects | C | | 3,00 | 114 | 2 | | | | 2A | |
| | Physics and Technology of Nanostructures (Research track) | | | 60,00 | 2 280 | 306 | 42 | 42 | 134 | 126 | |
| | Major | | | 30,00 | 1 140 | 260 | 40 | 40 | 114 | 104 | |
| | Major (5 из 6) | | | 30,00 | 1 140 | 260 | 40 | 38 | 96 | 86 | |
| 1 | Introduction to Nanophotonics | E | Department of Physics (at HSE University in St.Petersburg) | 6,00 | 228 | 74 | | | 38A | 36A | |
| 2 | Quantum Electrodynamics | E | Department of Physics (at HSE University in St.Petersburg) | 6,00 | 228 | 80 | 40A | 40A | | | |
| 3 | Methods of Quantum Field Theory in Condensed Matter Physics | E | Department of Physics (at HSE University in St.Petersburg) | 6,00 | 228 | 38 | | | 20 | 18A | |
| 4 | Optical methods of nanostructure analysis and photonic devices | E | Department of Physics (at HSE University in St.Petersburg) | 6,00 | 228 | 34 | | | 18 | 16A | |
| 5 | Technology of semiconductor nanostructures | E | Department of Physics (at HSE University in St.Petersburg) | 6,00 | 228 | 38 | | | 20 | 18A | |
| 6 | Physics of Low-Dimensional Systems | E | Department of Physics (at HSE University in St.Petersburg) | 6,00 | 228 | 34 | | | 18 | 16A | Online Course |
| | Key Seminars | | | 9,00 | 342 | 42 | 2 | 2 | 20 | 18 | |
| 1 | Research seminar "Methods for diagnostics of nanostructures" | C | Department of Physics (at HSE University in St.Petersburg) | 6,00 | 228 | 34 | | | 18A | 16 | |
| 2 | Mentor's Seminar | C | Department of Physics (at HSE University in St.Petersburg) | 3,00 | 114 | 8 | 2 | 2A | 2 | 2A | |
| | Magolego | | | 6,00 | 228 | | | | | | |
| 1 | Дисциплины по выбору из общеуниверситетского пула | E | | 6,00 | 228 | | | | | | |
| | Internship | | | 15,00 | 570 | 4 | | | | 4 | |
| | Research Internship | | | 12,00 | 456 | 2 | | | | 2 | |
| 1 | Research Internship | C | | 12,00 | 456 | 2 | | | | 2A | |
| | Project Internship | | | 3,00 | 114 | 2 | | | | 2 | |
| 1 | Projects | C | | 3,00 | 114 | 2 | | | | 2A | |
| | Condensed Matter Physics (Research track) | | | 60,00 | 2 280 | 296 | 70 | 66 | 96 | 92 | |
| | Major | | | 30,00 | 1 140 | 252 | 68 | 64 | 76 | 70 | |

| Major (5 из 6) | | | | 30,00 | 1 140 | 252 | 54 | 50 | 78 | 70 | |
|----------------------------|-------------------------------------------------------------|---|------------------------------------------------------------|--------------|--------------|------------|-----------|-----------|-----------|-----------|---------------|
| 1 | Introduction to Nanophotonics | E | Department of Physics (at HSE University in St.Petersburg) | 6,00 | 228 | 74 | | | 38A | 36A | |
| 2 | Quantum Many-Body Theory | E | Department of Physics (at HSE University in St.Petersburg) | 6,00 | 228 | 26 | 14 | 12A | | | |
| 3 | Quantum Electrodynamics | E | Department of Physics (at HSE University in St.Petersburg) | 6,00 | 228 | 80 | 40A | 40A | | | |
| 4 | Methods of Quantum Field Theory in Condensed Matter Physics | E | Department of Physics (at HSE University in St.Petersburg) | 6,00 | 228 | 38 | | | 20 | 18A | |
| 5 | Modeling of Quantum Systems | E | Department of Physics (at HSE University in St.Petersburg) | 6,00 | 228 | 26 | 14 | 12A | | | Online Course |
| 6 | Physics of Low-Dimensional Systems | E | Department of Physics (at HSE University in St.Petersburg) | 6,00 | 228 | 34 | | | 18 | 16A | Online Course |
| Key Seminars | | | | 9,00 | 342 | 42 | 2 | 2 | 20 | 18 | |
| 1 | Research Seminar "Physics of Strongly Disordered Systems" | C | Department of Physics (at HSE University in St.Petersburg) | 6,00 | 228 | 34 | | | 18 | 16A | |
| 2 | Mentor's Seminar | C | Department of Physics (at HSE University in St.Petersburg) | 3,00 | 114 | 8 | 2 | 2A | 2 | 2A | |
| Magolego | | | | 6,00 | 228 | | | | | | |
| 1 | Дисциплины по выбору из общеуниверситетского пула | E | | 6,00 | 228 | | | | | | |
| Internship | | | | 15,00 | 570 | 2 | | | | | 4 |
| Research Internship | | | | 12,00 | 456 | 2 | | | | | 2 |
| 1 | Research Internship | C | | 12,00 | 456 | 2 | | | | | 2A |
| Project Internship | | | | 3,00 | 114 | | | | | | 2 |
| 1 | Projects | C | | 3,00 | 114 | 2 | | | | | 2A |

Curriculum agreed:

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|----------------------------------------------|-------------------|------------|
| Academic Supervisor | SHENDEROVICH I.E. | 19.05.2022 |
| Dean | OMELCHENKO A.V. | 19.05.2022 |
| Deputy Director | KUZMIN P.V. | 19.05.2022 |
| Head of Degree Programmes Development Office | MAMONOVA M.A. | 19.05.2022 |

* Subject type:

Compulsory course

Elective course

C

E