Programme Title: BSc Physics with Particle Physics with a Year Abroad

Programme Specification (UG)

Awarding body / institution:	Queen Mary University of London
Teaching institution:	Queen Mary University of London
Name of final award and programme title:	BSc Physics with Particle Physics, BSc Physics with Particle Physics with Year Abroad
Name of interim award(s):	CertHE; DipHE
Duration of study / period of registration:	Three years (Four Years with Year Abroad).0
QMUL programme code / UCAS code(s):	F392, F39Y
QAA Benchmark Group:	Physics
FHEQ Level of Award :	Level 6
Programme accredited by:	Institute of Physics
Date Programme Specification approved:	
Responsible School / Institute:	School of Physical and Chemical Sciences

Schools / Institutes which will also be involved in teaching part of the programme:

Collaborative institution(s) / organisation(s) involved in delivering the programme:

Programme outline

The Physics with Particle Physics with a Year Abroad Programme closely follows the core physics programme but with an emphasis on experimental particle physics. In particular, some modules that are options in F300 are required in this programme: Statistical Data Analysis and Particle and Nuclear Physics. The extended physics project will normally be under the supervision of an academic member of staff from the Particle Physics Research Centre.

The Year Abroad programme follows the BSc Physics with Particle Physics programme with the addition of a non-weighted Study Abroad Year that does not count towards the final degree award. If you are a BSc student and choose to do study abroad, this will take place in Year 3, and the Year 3 modules will instead be studied in Year 4.

Aims of the programme

We aim to:
i. teach physics of high quality within an excellent research environment;
ii. recruit students able to benefit from a university education;

iii. provide a programme that enables students with a variety of educational backgrounds to pursue physics as a subject;
iv. provide access to such variety of modules, including those from other disciplines, as to enable students to tailor their studies to their own needs and interests;
v. instill in our students an understanding of the working of the physical world;
vi. encourage students to develop transferable skills that are applicable to a variety of careers;
vii. provide a programme that prepares students, where appropriate, for a range of professional careers in physics.
viii. provide opportunities for students to appreciate the beauty of physics and to develop a desire for learning.

What will you be expected to achieve?

Students successfully completing this programme will:

Please note that the following information is only applicable to students who commenced their Level 4 studies in 2017/18, or 2018/19

In each year of undergraduate study, students are required to study modules to the value of at least 10 credits, which align to one or more of the following themes:

- networking
- multi- and inter-disciplinarity
- international perspectives
- enterprising perspectives.

These modules will be identified through the Module Directory, and / or by your School or Institute as your studies progress.

Academic Content:	
A 1	Have acquired a core knowledge of physics, including comprehending basic physical laws and principles
A 2	Have acquired a knowledge of more specialist topics in Particle Physics, and how core physics is related
A 3	Be able to communicate this knowledge, clearly and accurately
A 4	Have acquired essential ICT skills for analysing data, simulating physical systems, retrieving information and communicating scientific results
A 5	Be able to undertake numerical manipulation and present or interpret information graphically
A 6	Be able to execute and analyse the results of an experiment or investigation, including evaluating uncertainties and comparing results with expected outcomes

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Disciplinary Skills - able to:	
B 1	Have acquired essential skills in the art of scientific report-writing and in the oral presentation of technical material.
B 2	Be able to apply scientific methods to the analysis of problems.
B 3	Be able to apply physical principles to diverse areas of physics
B 4	Solve physical problems by selecting and using appropriate mathematical and physical techniques
B 5	Be able to appreciate the role of science in general, and of physics in particular, within a broader range of human cultural activity
B 6	Understand concepts of equality, diversity and inclusion, and how they affect both the practice and progress of science
B 7	Identify ethical issues in scientific work, and recognise unprofessional or unethical behaviour
B 8	Understand what constitutes a safe working environment

Attributes:	
C 1	To acquire and apply knowledge in a rigorous way.
C 2	To connect information and ideas within their field of study.
C 3	To adapt their understanding to new and unfamiliar settings.
C 4	To manage and reflect upon own learning, making use of appropriate texts and learning materials
C 5	To use quantitative data confidently and competently.
C 6	To obtain transferable key skills to help them with their career goals and their continuing education.
C 7	To explain and argue clearly and concisely.
C 8	To apply their analytical skills to investigate unfamiliar problems.
C 9	To use information for evidence-based decision-making and creative thinking.
C 10	To work independently by using own initiative, be organised and meet deadlines
C 11	To work in a group, interacting constructively as part of a team

How will you learn?

Our programme is constructed within a modular course structure in which each student takes eight or nine modules per year. Our overall strategy is to achieve a balance, appropriate to the aims of each course unit, between teaching (lectures; practical laboratory work; small-group tutorials) and learning by students (peer discussion; exercise classes; coursework and essay assignments; independent work in laboratories and computer studies; teach-yourself computer packages and the Internet;

videos; textbooks and supplementary reading).

Exercise classes or laboratories are provided for all compulsory modules which are used to develop the specific skills needed. Two general physics laboratories are used to develop experimental skills, including the acquisition of data and the analysis of uncertainties of observation. In addition students learn to write a scientific account of their experimental observation. Finally, review and experimental projects are used to develop students' investigative skills. Students studying Physics with Particle Physics normally undertake their project under the supervision of a member of the Particle Physics Research Centre.

How will you be assessed?

Assessment is by a mixture of continuous assessment and formal written examinations at the end of each year. We use a variety of in-course assessments to enable students to get quick feedback as to their performance. These include weekly coursework (marked and returned on a weekly basis), essay assignments, mid-term tests carried out in a lecture slot, performance in exercise classes and tutorials, laboratory and project reports. These in-course assessments are combined with formal final written examination results and oral examinations (on project reports) to produce the final mark for each course unit. The precise mixture of in-course and final exam marks to give the overall mark varies between different course units and is specified in the detailed course unit description given in the Student Handbook and on the relevant QMPlus module web page.

Assessment for the study-abroad year will be conducted as per the module regulations of the relevant partner institution but will not contribute to the final degree award from QMUL.

How is the programme structured?

Please specify the structure of the programme diets for all variants of the programme (e.g. full-time, part-time - if applicable). The description should be sufficiently detailed to fully define the structure of the diet.

The programme consists of compulsory and elective modules. All undergraduate students at Queen Mary take 120 credits a year. A BSc degree consists of 360 credits. Most modules are worth 15 credits which means that students normally take 8 modules a year. In your fourth year students normally study for a project worth 30 credits. Students are required to take all modules marked as 'compulsory'. Where modules are indicated as "elective" or "suggested" or "optional" students may choose whether or not to take the module. Where there is space in the curriculum students at level 5 and 6 make take up to 15 credits per academic year from another School at Queen Mary. Students who chose this option are responsible for finding their own modules and complying with all registration requirements.

The third year of the programme can be conducted with a partner institution in another country.

Academic Year of Study FT - Year 1

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Professional Skills for Scientists	SPA4601	15	4	Compulsory	1	Semester 2
Mathematical Techniques 1	SPA4121	15	4	Compulsory	1	Semester 1
Classical Physics	SPA4401	15	4	Compulsory	1	Semester 1
Scientific Measurement	SPA4103	15	4	Compulsory	1	Semester 1

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Modern Physics	SPA4402	15	4	Compulsory	1	Semester 1
Electric and Magnetic Fields	SPA4210	15	4	Compulsory	1	Semester 2
Mathematical Techniques 2	SPA4122	15	4	Compulsory	1	Semester 2
Our Universe	SPA4101	15	4	Compulsory	1	Semester 2

Academic Year of Study FT - Year 2

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Thermodynamics	SPA5219	15	5	Compulsory	2	Semester 1
Quantum Mechanics A	SPA5319	15	5	Compulsory	2	Semester 1
Physics Laboratory	SPA5201	15	5	Compulsory	2	Semester 2
Condensed Matter A	SPA5228	15	5	Compulsory	2	Semester 2
Electromagnetic Waves and Optics	SPA5222	15	5	Compulsory	2	Semester 2
Mathematical Techniques 3	SPA5218	15	5	Compulsory	2	Semester 1
Planetary Systems	SPA5241	15	5	Elective	2	Semester 2
Stars	SPA5307	15	5	Elective	2	Semester 2
Physical Dynamics	SPA5304	15	5	Elective	2	Semester 2
Introduction to Scientific Computing	SPA5666	15	5	Compulsory	2	Semester 1
Practical Techniques for Data Science	SPA5131	15	5	Elective	2	Semester 2

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Professional Skills for Scientists II	SPA5601	0	5	Compulsory	2	Semesters 1 & 2

Academic Year of Study FT - Year 3

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
One of the following modules must be taken to qualify for one of the extramural year degrees:						
SPCS Study Abroad Year	SPC5555	120	5	Core	3	Semesters 1-3

Academic Year of Study FT - Year 3

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Statistical Physics	SPA6403	15	6	Compulsory	3	Semester 2
Extended Independent Project	SPA6776	30	6	Core	3	Semesters 1 & 2
Statistical Data Analysis	SPA6328	15	6	Compulsory	3	Semester 1
Quantum Mechanics B	SPA6413	15	6	Elective	3	Semester 1
Particle and Nuclear Physics	SPA6307	15	6	Compulsory	3	Semester 2
Physical Cosmology	SPA6311	15	6	Elective	3	Semester 1
Quantum Mechanics and Symmetry	SPA6325	15	6	Elective	3	Semester 2
The Physics of Galaxies	SPA6305	15	6	Elective	3	Semester 2
Spacetime and Gravity	SPA6308	15	6	Elective	3	Semester 1

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Machine Learning and Artificial Intelligence	SPA6330	15	6	Elective	3	Semester 2

What are the entry requirements?

Grades ABB at A-Level. This must include grade A or above in at least one of Mathematics and Physics. Both subjects are required. Excludes General Studies.
International Baccalaureate Diploma with a minimum of 32 points overall, including 6,5,5 from three Higher Level subjects. This must include 6 in Higher Level Mathematics or Physics, with both subjects being taken at Higher Level.

Access qualifications are not considered for entry to this programme.

Minimum five GCSE passes including English and Maths at grade C or 4.

How will the quality of the programme be managed and enhanced? How do we listen to and act on your feedback?

The Staff-Student Liaison Committee provides a formal means of communication and discussion between schools/institutes and its students. The committee consists of student representatives from each year in the school/institute together with appropriate representation from staff within the school/institute. It is designed to respond to the needs of students, as well as act as a forum for discussing programme and module developments. Staff-Student Liaison Committees meet regularly throughout the year. Each school/institute operates a Learning and Teaching Committee, or equivalent, which advises the School/Institute Director of Education on all matters relating to the delivery of taught programmes at school level including monitoring the application of relevant QM policies and reviewing all proposals for module and programme approval and amendment before submission to Taught Programmes Board. Student views are incorporated in the committee's work in a number of ways, such as through student membership, or consideration of student surveys.

All schools/institutes operate an Annual Programme Review of their taught undergraduate and postgraduate provision. APR is a continuous process of reflection and action planning which is owned by those responsible for programme delivery; the main document of reference for this process is the Student Experience Action Plan (SEAP) which is the summary of the school/ institute's work throughout the year to monitor academic standards and to improve the student experience. Students' views are considered in this process through analysis of the NSS and module evaluations.

What academic support is available?

The Department of Physics and Astronomy provides each student with an academic advisor, normally the same member of staff for the duration of a student's studies, who can provide academic and pastoral guidance. Additionally the School has a dedicated Student Support Officer who is available to discuss any student related problem. The School runs an open door policy which encourages the students to come and talk to their advisor, other academics or the dedicated Student Support Officer. The School also actively participates in the QMUL Peer Assisted Study Scheme (PASS).
The Senior Tutor has overall responsibility for academic support and pastoral care within the Department. The Senior Tutor also has a key role in overseeing the School's attendance policy. The Senior Tutor will address any problems that cannot be resolved by a student's academic adviser or the Student Support Officer.

How inclusive is the programme for all students, including those with disabilities?

Queen Mary has a central Disability and Dyslexia Service (DDS) that offers support for all students with disabilities, specific learning difficulties and mental health issues. The DDS supports all Queen Mary students: full-time, part-time, undergraduate, postgraduate, UK and international at all campuses and all sites.

Students can access advice, guidance and support in the following areas:
• Finding out if you have a specific learning difficulty like dyslexia

- Applying for funding through the Disabled Students' Allowance (DSA)
- Arranging DSA assessments of need
- Special arrangements in examinations
- Accessing loaned equipment (e.g. digital recorders)
- Specialist one-to-one "study skills" tuition
- Ensuring access to course materials in alternative formats (e.g. Braille)
- Providing educational support workers (e.g. note-takers, readers, library assistants)
- Mentoring support for students with mental health issues and conditions on the autistic spectrum.

Programme-specific rules and facts

This programme follows the standard QM progression criteria and degree classification algorithm. The final degree classification is determined by the college mark which is a weighted average of the first, second and third year averages in the ratio 1:3:6 respectively.

For students registered on the Year Abroad Programme, progression differs from the standard QMUL regulations in the following respects: Progression from year two to year three (year abroad) is as per the standard regulations with the additional requirement of an average grade above 60%. Progression from year 3 to year 4 requires a minimum of a 90 credits passed during year 3 abroad. Students failing either the progression hurdles from year 2 to year 3 (study abroad) or year 3 to year 4 will be transfered to the equivalent non-study-abroad BSc Physics programme, entering into year 3 of that programme with the appropriate progression hurdles from that programme to be applied. In order to graduate students must obtain at least 315 credits from years 1 2 and 4. The final degree classification is determined by the college mark which is a weighted average of the first, second and fourth year averages in the ratio 1:3:6 respectively. The year abroad does not contribute to the final college mark nor the final degree classification.

The year abroad module is core. If resits are offered by the host institution for failed modules during the year abroad then students will be entitled to resits. If the host institution does not offer resits then the students will not be entitled to resits.

Links with employers, placement opportunities and transferable skills

The Department actively participates in the South East Physics Network (SEPNet) summer internship programme as well as funding a small number of internal, paid summer internships. The School works closely with the Careers Service to provide a series of bespoke events for physics students and has also recently prepared a careers booklet, in conjunction with the Institute of Physics, detailing careers opportunities for students of physics and explaining the necessary skill sets required for each area of work.

Many of our BSc graduates go on to further specialist study of Physics at MSc or PhD level but significant numbers aim at careers that indirectly use their physics training. Differently, almost all MSci graduates go on to further specialist study of Physics at PhD level however they may easily enter a range of other career paths that use the transferable skills gained in the MSci programme of study.

These employment areas include teaching at secondary or tertiary level, management, finance, IT and journalism. All physics graduates with reasonable degrees are highly employable because of the skills they gain in their studies. The most important of these skills are: numeracy, familiarity with computers and IT, problem-solving skills, ability to carry out measurement and observation and to analyse the results thereof, the ability to write technical reports and the ability to give oral presentations of scientific arguments.

Recent experience from students taking a project in particle physics or a Summer internship shows that they became very enthusiastic about the subject studied and continued their studies in particle physics either with a PhD or a Master. In other instances, students moved easily to the financial sector.

Programme Specification Approval

Person completing Programme Specification: Lesley Howell

Queen Mary University of London

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Person responsible for management of programme:	Christopher White as DTL for DPA
Date Programme Specification produced / amended by School / Institute Learning and Teaching Committee:	8 Dec 2023
Date Programme Specification approved by Taught Programmes Board:	

Queen Mary University of London