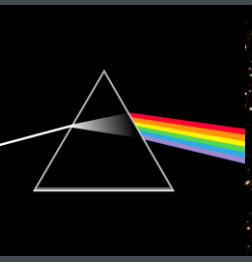
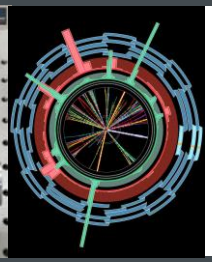
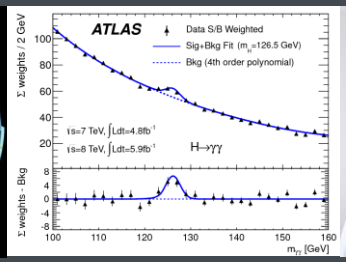


PH3110
BSc project

Prof. Pedro Teixeira-Dias

27 May 2022

ROYAL HOLLOWAY UNIVERSITY OF LONDON

Overview

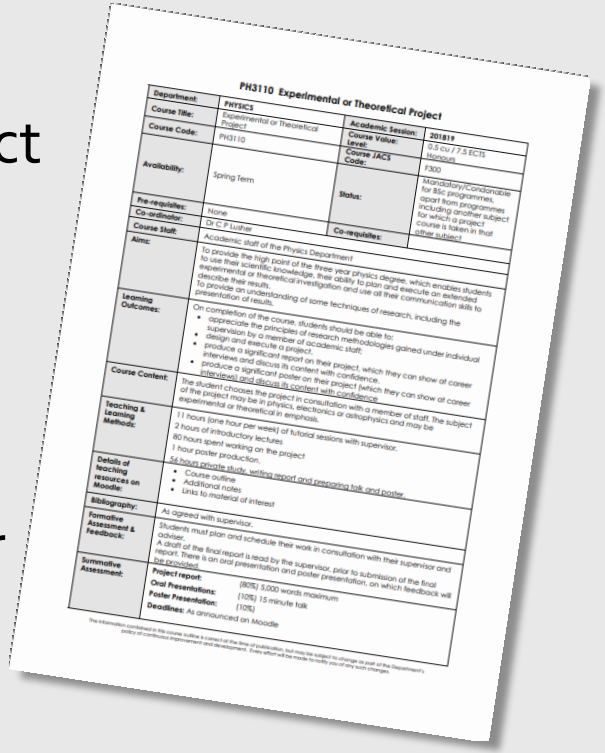
Over the coming weeks you will have to identify your preferences for your final year BSc Project

In this presentation:

- What is the BSc Project?
- How is it assessed?
- What is expected of you?
- Timeline of the Project
- How to go about choosing your preferred project topics

What is the BSc Project?

- One of your eight modules next year
- PH3110 – Experimental or Theoretical Project
- Runs in Spring Term
- You will be supervised individually by a member of staff, for the whole term
- Weekly scheduled meetings with supervisor
- Full details in course specification →



PH3110 Experimental or Theoretical Project

Department:	PHYSICS		
Course Title:	Experimental or Theoretical Project	**Academic Session:**	2018/19
Course Code:	PH3110	**Course Value:**	0.5 CU / 7.5 ECTS Credits
		Level:	H
Availability:	Spring Term	**Course JACS Code:**	F300
		Status:	Mandatory/Condonable for BSc programmes, apart from programmes including another subject for which a project course is taken in that other subject
Pre-requisites:	None		
Co-ordinator:	Dr C P Lusher	**Co-requisites:**	
Course Staff:	Academic staff of the Physics Department		
Aims:	To provide the high point of the three year physics degree, which enables students to use their scientific knowledge, their ability to plan and execute an extended experimental or theoretical investigation and their communication skills to describe their results. To provide an understanding of some techniques of research, including the presentation of results.		
Learning Outcomes:	On completion of the course, students should be able to: • appreciate the principles of research methodologies gained under individual supervision by a member of academic staff; • design and execute a project; • produce a significant report on their project, which they can show at career interviews and discuss its content with confidence. • produce a significant poster on their project which they can show at career interviews and discuss its content with confidence.		
Course Content:	The student chooses the project in consultation with a member of staff. The subject of the project may be in physics, electronics or astrophysics and may be experimental or theoretical in emphasis.		
Teaching & Learning Methods:	11 hours (one hour per week) of tutorial sessions with supervisor. 2 hours of introductory lectures 80 hours spent working on the project 1 hour poster production. 54 hours private study, writing report and preparing talk and poster.		
Details of teaching resources on Moodle:	• Course outline • Additional notes • Links to material of interest		
Bibliography:	As agreed with supervisor.		
Formative Assessment & Feedback:	Students must plan and schedule their work in consultation with their supervisor and adviser. A draft of the final report is read by the supervisor, prior to submission of the final report. There is an oral presentation and poster presentation, on which feedback will be provided.		
Summative Assessment:	**Project report:** (80%) 5,000 words maximum **Oral Presentation:** (10%) 15 minute talk **Poster Presentation:** (10%) **Deadlines:** As announced on Moodle		

Aims of the BSc Project

To provide the high point of the three year physics degree, which enables students to

- use their scientific knowledge,
- apply their ability to plan and execute an extended experimental or theoretical investigation, and
- use all their communication skills to describe their results.

To provide an understanding of some techniques of research, including the presentation of results.

Learning Outcomes

On completion of the course students should be able to:

- appreciate the principles of research methodologies gained under individual supervision by a member of academic staff;
- design and execute a project;
- produce a significant report on their project, which they can show at career interviews and discuss its content with confidence;
- produce a significant poster on their project (which they can show at career interviews) and discuss its content with confidence.

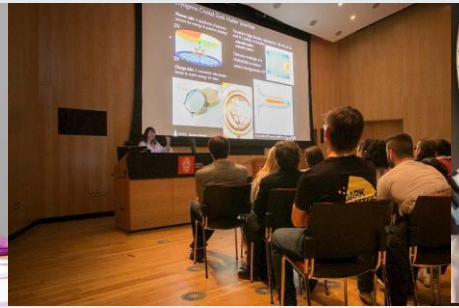
How is it assessed?

Project Report (5,000 words)	80%
Viva voce (presentation + questions)	10%
Poster Presentation	10%

What is expected of you

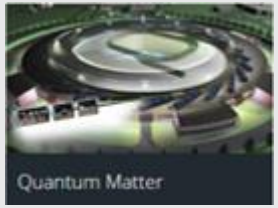
You will spend ~150 hours of work on the project, comprising:

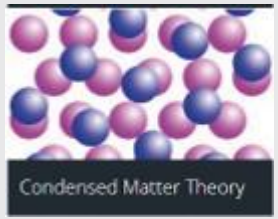
- at least 1 hour per week in a scheduled meeting with your supervisor;
- 2-3 hours attending lectures on relevant information and general skills training;
- ~80 hours working on the project;
- ~60 hours private study, writing report and preparing the talk and the poster.

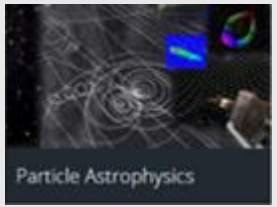
Broad Timeline

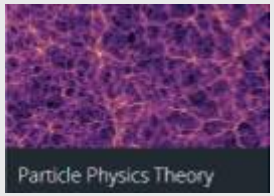
- You express your project preferences in coming weeks: specifics will be emailed soon
- You will find out your allocated project during the Autumn term
- You will meet with your supervisor in the last week of Autumn term, to agree reading and preparation required for project work
- Weeks 1-8 of Spring Term: lots of hard work on project + submit draft report to supervisor
- Week 9: submission of final report (via Turnitin)
- Week 10 or 11: Viva with supervisor and 2nd marker (includes talk)
- Week 11: poster submission + poster session
- Exact Deadlines will be communicated later as appropriate (via moodle, or email)



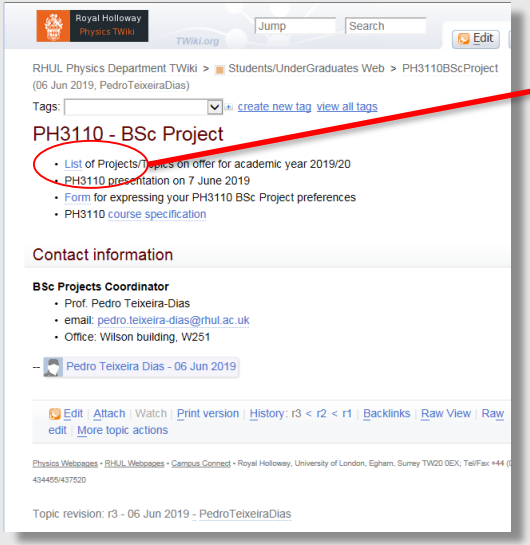


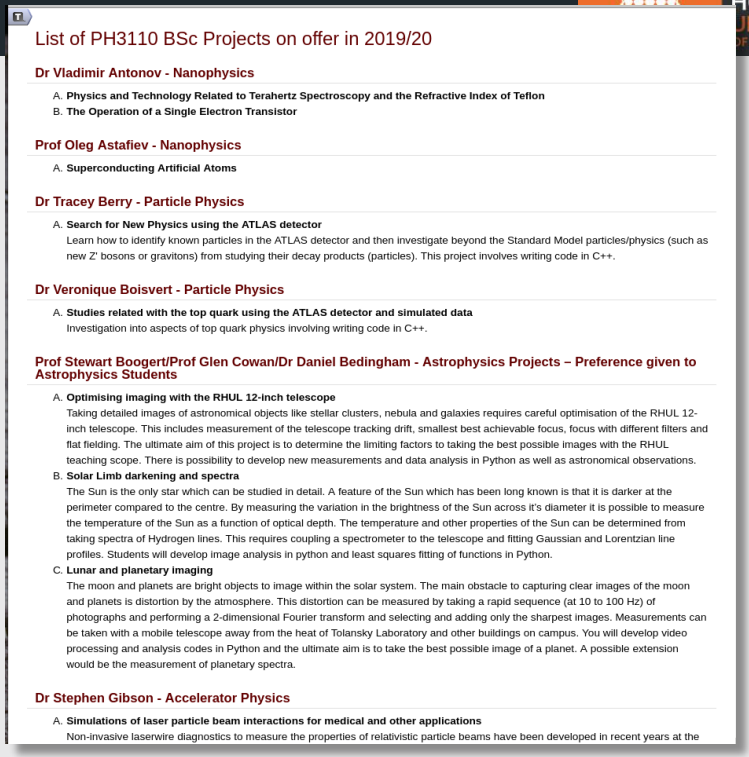
Quantum Materials and Quantum Technologies	Particle, Accelerator and Astrophysics
Philipp Niklowitz	Daniel Bedingham
John Saunders	Glen Cowan
Andrew Casey	Tracey Berry
Xavier Rojas	Veronique Boisvert
	Pedro Teixeira-Dias
Oleg Astafiev, Jon Goff	Jocelyn Monroe
Vladimir Antonov	Asher Kaboth
James Nicholls	Greg Ashton
Phil Meeson	Nikolas Kauer
Gregoire Ithier	Stephen West
Andrew Ho	Stewart Boogert
David Heyes	Stephen Gibson
Giovanni Sordi	Pavel Karataev





List of Projects on offer





List of PH3110 BSc Projects on offer in 2019/20

Dr Vladimir Antonov - Nanophysics

A. **Physics and Technology Related to Terahertz Spectroscopy and the Refractive Index of Teflon**
B. **The Operation of a Single Electron Transistor**

Prof Oleg Astafiev - Nanophysics

A. **Superconducting Artificial Atoms**

Dr Tracey Berry - Particle Physics

A. **Search for New Physics using the ATLAS detector**
Learn how to identify known particles in the ATLAS detector and then investigate beyond the Standard Model particles/physics (such as new Z' bosons or gravitons) from studying their decay products (particles). This project involves writing code in C++.

Dr Veronique Boisvert - Particle Physics

A. **Studies related with the top quark using the ATLAS detector and simulated data**
Investigation into aspects of top quark physics involving writing code in C++.

Prof Stewart Boogert/Prof Glen Cowan/Dr Daniel Bedingham - Astrophysics Projects – Preference given to Astrophysics Students

A. **Optimising imaging with the RHUL 12-inch telescope**
Taking detailed images of astronomical objects like stellar clusters, nebula and galaxies requires careful optimisation of the RHUL 12-inch telescope. This includes measurement of the telescope tracking drift, smallest best achievable focus, focus with different filters and flat fielding. The ultimate aim of this project is to determine the limiting factors to taking the best possible images with the RHUL teaching scope. There is possibility to develop new measurements and data analysis in Python as well as astronomical observations.
B. **Solar Limb darkening and spectra**
The Sun is the only star which can be studied in detail. A feature of the Sun which has been long known is that it is darker at the perimeter compared to the centre. By measuring the variation in the brightness of the Sun across it's diameter it is possible to measure the temperature of the Sun as a function of optical depth. The temperature and other properties of the Sun can be determined from taking spectra of Hydrogen lines. This requires coupling a spectrometer to the telescope and fitting Gaussian and Lorentzian line profiles. Students will develop image analysis in python and least squares fitting of functions in Python.
C. **Lunar and planetary imaging**
The moon and planets are bright objects to image within the solar system. The main obstacle to capturing clear images of the moon and planets is distortion by the atmosphere. This distortion can be measured by taking a rapid sequence (at 10 to 100 Hz) of photographs and performing a 2-dimensional Fourier transform and selecting and adding only the sharpest images. Measurements can be taken with a mobile telescope away from the heat of Tolansky Laboratory and other buildings on campus. You will develop video processing and analysis codes in Python and the ultimate aim is to take the best possible image of a planet. A possible extension would be the measurement of planetary spectra.

Dr Stephen Gibson - Accelerator Physics

A. **Simulations of laser particle beam interactions for medical and other applications**
Non-invasive laserwire diagnostics to measure the properties of relativistic particle beams have been developed in recent years at the

TWiki: list of projects on offer, at

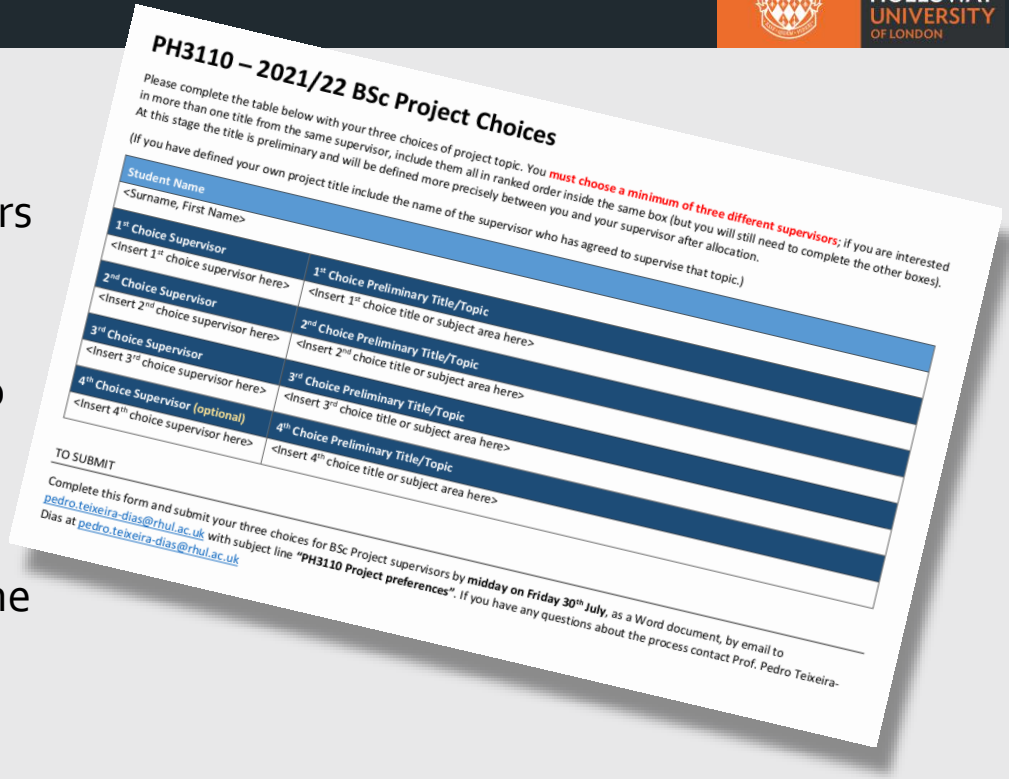
https://twiki.ph.rhul.ac.uk/twiki/bin/view/Students/UnderGraduates/PH3110BScProject

How to decide your preferences

- Look at the list of projects on offer
- email potential supervisors if you have questions
- Look at posters from previous years
- Take into account any specific skills that might be needed for the project and/or other pre-requisites (eg: certain courses, programming skills, mathematical ability, etc)
- In principle, a project topic could be suggested by the student, but you will need to obtain agreement with a supervisor prior to submitting that as one of your preferences.

How to express your preferences

- There is a Form on the TWiki for this
- You must choose 3 different supervisors
- Fill in the form
- Email the form (in MS Word format) to the BSc Projects Coordinator (pedro.teixeira-dias@rhul.ac.uk)
- Detailed instructions are included in the form.



PH3110 – 2021/22 BSc Project Choices

Please complete the table below with your three choices of project topic. You **must choose a minimum of three different supervisors**; if you are interested in more than one title from the same supervisor, include them all in ranked order inside the same box (but you will still need to complete the other boxes). At this stage the title is preliminary and will be defined more precisely between you and your supervisor after allocation.

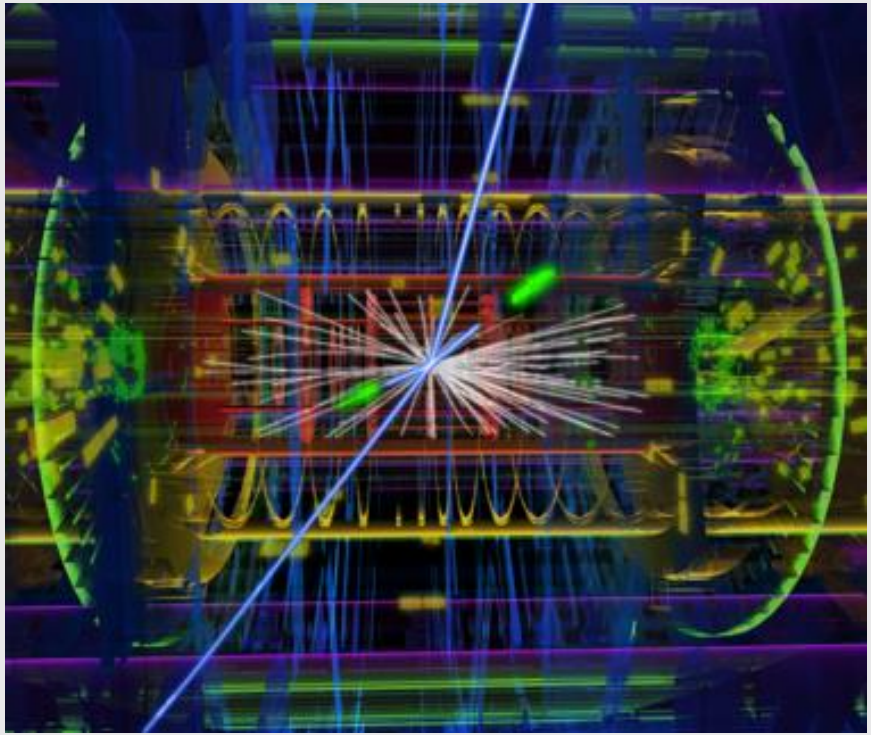
(If you have defined your own project title include the name of the supervisor who has agreed to supervise that topic.)

Student Name <Surname, First Name>	
1st Choice Supervisor <Insert 1st choice supervisor here>	1st Choice Preliminary Title/Topic <Insert 1st choice title or subject area here>
2nd Choice Supervisor <Insert 2nd choice supervisor here>	2nd Choice Preliminary Title/Topic <Insert 2nd choice title or subject area here>
3rd Choice Supervisor <Insert 3rd choice supervisor here>	3rd Choice Preliminary Title/Topic <Insert 3rd choice title or subject area here>
4th Choice Supervisor (optional) <Insert 4th choice supervisor here>	4th Choice Preliminary Title/Topic <Insert 4th choice title or subject area here>

TO SUBMIT

Complete this form and submit your three choices for BSc Project supervisors by **midday on Friday 30th July**, as a Word document, by email to pedro.teixeira-dias@rhul.ac.uk with subject line **"PH3110 Project preferences"**. If you have any questions about the process contact Prof. Pedro Teixeira-Dias at pedro.teixeira-dias@rhul.ac.uk

In case of any questions



Contact me, BSc Projects Coordinator

- Prof. Pedro Teixeira-Dias
- email: pedro.teixeira-dias@rhul.ac.uk
- Office: Wilson building W251


Thank you for your attention…
Questions?

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