

## 57TH SCOTTISH UNIVERSITIES SUMMER SCHOOL IN PHYSICS

"LHC Phenomenology"

17- 29 August 2003

John Burnet Hall, St. Andrews, Fife, KY16 9JF,  
Scotland

<http://www.ippp.dur.ac.uk/sussp57>



### GENERAL INFORMATION

#### **The Scottish Universities Summer School Series**

The Scottish Universities' Summer School in Physics was founded in 1960 by the four older Scottish Universities. The Schools are held annually with at least one School in each year. The SUSSP57 School is being partly supported by the Institute for Particle Physics Phenomenology (IPPP) of the University of Durham.

#### **The Nature of the School**

The level of the School is designed to attract outstanding second and third year postgraduates and young postdoctoral workers in the subject, together with a few more senior specialists in closely related fields — to broaden the discussion and to help established workers to change their research interests.

#### **Scientific Content**

With the LHC under construction and due to come on line in 2007, it is timely for a summer school to focus on LHC phenomenology. At a time when the experimental effort is directed to detector construction and software development, it is vitally important to focus young members of the experimental community on the *physics* that the LHC will deliver. At the same time there is a continuing need to bring more young theorists into phenomenology, and in particular to inform them about the basic properties and capabilities of the machine and of the detectors and software required for physics analyses.

The range of physics covered by the LHC is very broad: from the searches for the Higgs boson and Physics beyond the Standard Model to detailed studies of Quantum Chromodynamics, the B-physics sectors and the properties of hadronic matter at high energy density as realised in heavy ion collisions. The School will aim to cover all these at a pedagogical level, starting with a basic introduction to the standard model and its most likely extensions. Theoretical training will be supplemented by courses on the detector capabilities and search strategies.

## Lecture Programme

<i>Standard Model Foundations</i>	Douglas Ross (Southampton)	6 Lectures
<i>Standard Model Phenomenology</i>	Keith Ellis (Fermilab)	6 Lectures
<i>Beyond the Standard Model</i>	John Ellis (CERN)	6 Lectures
<i>General Purpose Detectors</i>	Tejinder Virdee (Imperial College)	3 Lectures
<i>Higgs and New Physics Searches</i>	Andy Parker (Cambridge)	4 Lectures
<i>b Physics</i>	Val Gibson (Cambridge)	4 Lectures
<i>Forward Physics at LHC</i>	Albert de Roeck (CERN)	2 Lectures
<i>Heavy Ion Physics</i>	Bärndt Muller (Duke)	3 Lectures
<i>LHC Construction</i>	Rüdiger Schmidt (CERN)	2 Lectures
<i>LHC Grid Computing</i>	Hans Hoffmann (CERN)	2 Lectures

## Payment of School Fees

The School Fee is GBP 700. The fee (deducting any bursary awarded) should be received by **Monday 28<sup>th</sup> July** at the latest. Please see the enclosed letter for details of how to pay the School Fee.

## About St. Andrews

St. Andrews is a small town with a population of thirteen thousand on the east coast of Fife overlooking the North Sea, about 50 miles north of Edinburgh. Its coastal location gives it a dry, sunny and breezy climate. It has a wealth of historic buildings, some dating from as early as the 10th century. One of the gates of the medieval city survives along with the ruins of the 12th century cathedral and castle that overlook the sea. The University in St. Andrews was established 500 years ago. There are many places of interest on the outskirts, some accessible by foot, others by car or bus. Links to general information about St. Andrews are posted on the SUSSP57 website, by clicking on Tourist Information.

## Accommodation

All participants will be accommodated in single or double rooms with full board in John Burnet Hall, Links Crescent, St. Andrews. All meals will be taken in John Burnet Hall which is just five minutes walk from the centre of St. Andrews and from the School of Physical Sciences where the lectures will be held.

## Sports Facilities

The facilities of the University's Physical Education Centre are normally available to all staying at John Burnet Hall. These include squash, badminton, table tennis, basketball, netball, 5-a-side football, volleyball, croquet, tennis and a sauna. Equipment can be hired at the centre. There is also an attractive swimming pool at the East Sands leisure centre.

## Golf at St. Andrews

Golf was first played in St. Andrews around 1400. It is the home of the Royal and Ancient Golf Club, the sports ruling body. There are numerous courses in St. Andrews offering top quality golf. The Old Course is the most famous, one of the venues for the Open Championship. All five older course (Old, New, Eden, Jubilee and Strathclyde) are open to the public, on payment of the appropriate green fee. Golf clubs can be hired in St. Andrews.

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## Social Programme

A variety of entertainments in John Burnet Hall and St. Andrews will be arranged. These will include the School Banquet which will take place during the final week of the School. In addition some half-day and whole day excursions to places of interest near to St. Andrews and further afield will be organised as part of the extensive social programme for participants and accompanying persons. For full details click on the Social Programme link on the SUSSP57 website.

## Travelling to St. Andrews

Almost all participants will find it convenient to travel via Edinburgh, whether they come by car, by air or by rail. This travel information should enable all participants to organise their journey to St. Andrews, in particular for arrival on Sunday August 17. The schematic diagram (see end of this document) should help participants to plan their route. Although some of the information is taken from recently published timetables we cannot guarantee complete accuracy and therefore participants should check relevant information with their travel agents at the time of booking.

There will be free coach transport provided for the convenience of those participants who may wish to be transferred from either Edinburgh or Leuchars to John Burnet Hall (Section 2). Access to rooms will be from 14.00 onwards on Sunday August 17. There will be a buffet dinner at 19.30. Those who let us know they are arriving later than 20.30 will be provided with a cold evening meal.

### 1. Travelling by Car

From Edinburgh take the A90 to the Forth Road Bridge. The bridge has a toll that costs 80p for a private car in the northbound direction. Cross the bridge and proceed north along the M90 to Junction 8, and take the A91 to St. Andrews. Follow the A91 through Cupar following the signs to St. Andrews. There are useful maps including interactive versions at

<http://www.st-and.ac.uk/getting.shtml>

You will find John Burnet Hall on your right almost immediately after the first roundabout. John Burnet Hall has a small car park and there is additional parking space at the Physics Department, a few minutes walk away. Car parking in St. Andrews itself is subject to restrictions.

<http://www.st-and.ac.uk/services/resbus/JBHview.html>

### 2. The SUSSP57 transfer coach from Edinburgh

On Sunday August 17 SUSSP57 will provide a free coach service for the transfer of participants from Edinburgh airport and city centre to John Burnet Hall in St. Andrews. The coach will first pick up participants at Edinburgh Airport, arriving at 16.00 and departing at 16.45. It will then proceed to the city centre, parking on Waverley Bridge above Edinburgh Waverley Railway Station, arriving at approximately 17.15 and departing at 17.45 for John Burnet Hall. The journey time from Edinburgh to St. Andrews will be approximately 80 minutes.

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Edinburgh Waverley to Leuchars											
Edinburgh dep.	17.15	17.25	18.42	<b>18.50</b>	19.15	21.00	22.25				
Leuchars arr.	18.30	18.47	19.46	<b>19.58</b>	20.30	22.02	23.40				
				<b>Direct</b>							

From <http://www.thetrainline.com/>

Participants arriving at Leuchars should either catch a bus or taxi to St. Andrews if no SUSSP57 transport is available. There is a free telephone at Leuchars station for calling taxis. We will meet the direct services from London where possible, but cannot guarantee to meet all local services from Edinburgh.

There are online booking services at

<http://www.gner.co.uk>

<http://www.TheTrainLine.co.uk>

<http://www.scotrail.co.uk>

#### 4. By air to Edinburgh Airport

Participants may have to change in the UK on the journey to Edinburgh/St. Andrews. The main internal flights to Edinburgh are from Birmingham, East Midlands, London Gatwick, London Heathrow, London Stansted, London Luton, London City and Manchester.

<http://www.britishairways.co.uk>

<http://www.bmibaby.com>

<http://www.easyjet.com>

<http://www.scotairways.co.uk>

<http://www.flybe.com>

There are direct flights to Edinburgh from several European airports including Amsterdam, Brussels, Cologne, Copenhagen, Dublin, Frankfurt, Paris, Prague and Zurich.

<http://www.klmuk.com>

<http://www.sabena.com>

<http://www.flybmi.com>

<http://www.aerlingus.ie>

<http://www.crossair.com>

<http://www.ryanair.com>

Ryanair direct flights to Edinburgh are from Dublin only. The low-cost flights by Ryanair from European destinations to Glasgow are to Glasgow (Prestwick) NOT Glasgow International (Abbotsinch) Airport. Prestwick is some thirty miles south of Glasgow itself and passengers to

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Prestwick will have to travel by train from the airport railway station to Glasgow Central railway station. They must then walk to Glasgow Queen Street station to complete the remaining part of their journey.

## 5. From Edinburgh Airport

The SUSSP57 coach (see Section 2) will pick up participants at the airport between 16.00 and 16.45. **Please let us know your flight details if you wish to use this service. A courier will meet you at the arrivals point.**

Participants arriving at the airport too late to catch the coach should travel via airport bus or taxi to the city centre for immediate onward travel to Leuchars by rail (Section 3).

Taxis operating from the terminal take about 20 minutes to reach the city centre and cost about £15. Airlink bus services operate every 10 minutes from the terminal to the City Centre terminus at Waverley Bridge, situated above Edinburgh Waverley station. The journey takes about 25 minutes and costs £3.30 single and £5.00 for an open return. (If you have time to spare, your ticket also entitles you to a £1 reduction on a City Sightseeing Edinburgh Tour bus. You can also buy an Aisaver ticket for £4.20 that also gives you unlimited travel on Lothian transport buses for a day.)

Those participants arriving much earlier than 16.00 at the airport may wish to travel into Edinburgh to spend some time sight-seeing in Edinburgh City Centre. Participants spending time in Edinburgh should join the SUSSP57 coach at Waverley Bridge between 17.15 and 17.45. The coach will leave promptly. There is a left luggage office at Edinburgh Waverley railway station.

Those arriving too late to connect with the SUSSP57 coach should take the first train to Leuchars (Section 3) from Edinburgh Waverley.

## 6. By air to Glasgow Airport

Although Glasgow Airport is much further from St. Andrews than Edinburgh Airport, it has some transatlantic flights that can make it a convenient destination, avoiding the need to change in London. There are direct flights into Glasgow Airport from Chicago, Gothenburg, Halifax, New York, and Toronto with five other US destinations via Reykjavik with Icelandair.

<http://www.continental.com>

<http://www.aircanada.com>

<http://www.icelandair.co.uk>

## 7. From Glasgow Airport

There is a Scottish CityLink airport coach service from the terminal forecourt to Buchanan Street Bus Station in Glasgow, taking 20 minutes and this costs £3.30 single and £5 return. Taxis to Glasgow City Centre cost about £20.

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From Buchanan Street Bus Station there are connecting express coach services to central Edinburgh. The fare is £4. The Edinburgh central bus station is within easy walking distance of Waverley Bridge and Edinburgh Waverley railway station.

Participants may prefer to alight from the Scottish CityLink airport service at North Hanover Street for Glasgow Queen Street main railway station. There is a Scotrail service, leaving every 30 minutes, from Glasgow Queen Street to Edinburgh Waverley. The journey time to Edinburgh is 49 minutes and single costs about £7. There are connecting rail services from Edinburgh Waverley to Leuchars for St. Andrews (see Section 3) that take about 60 minutes. The free SUSSP57 coach leaves from Waverley Bridge near Edinburgh Waverley station at 17.45 to transfer passengers to John Burnet Hall. The coach journey from Edinburgh will take about 90 minutes.

<http://www.scotrail.co.uk>

## **8. By coach from London**

There are inter-city express coaches operating between most major cities in England and Scotland. Coaches from London operate mainly from London Victoria Coach Station, although some services pick-up at London Heathrow Central Bus Station. The journey is about 8-9 hours as opposed to about 5 hours by train. Tickets vary in price but cost around £35.00 return. Services from London to Edinburgh, and Dundee are available. There is a National Express internet booking service at

<http://nationalexpress.com>

## **9. Accommodation before the School**

Accommodation at John Burnett Hall is not available before Sunday August 17 or after lunch on Friday August 29. Those wishing to arrive before August 17 or wishing to extend their stay after the School will have to make their own arrangements. Accommodation in Edinburgh and St. Andrews can be booked through the appropriate Tourist Information Centres.

The Edinburgh & Lothians Tourist Board has an information centre above Edinburgh Waverley railway station. You can book accommodation and tours via email

<http://www.edinburgh.org>

mailto: info@visitscotland.com

Tel: 0845 2255 121 (UK only)

+44 (0) 1506 832 121 (outside UK)

University of Edinburgh Halls of Residence accommodation can be booked via Edinburgh First at

<http://www.edinburghfirst.com/accommodation/rates.html>

mailto://group.accommodation@ed.ac.uk

Tel: 0044 131 651 2099

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The Edinburgh International Arts Festival runs from August 10 to August 30, the Edinburgh Festival Fringe runs from August 3 to August 25, and the Edinburgh Military Tattoo runs from August 1 to August 23 so accommodation in Edinburgh will be in great demand during these dates.

<http://www.edinburgh-festivals.com>

<http://www.edfringe.com>

<http://www.go-edinburgh.co.uk/>

There is a tourist information centre in Market Street in St. Andrews at

St Andrews Tourist Information Centre

70 Market St, St Andrews, KY16 9NU

Tel: 01334 472021

Fax: 01334 478422

You can also book bed & breakfast accommodation at University of St. Andrews at

<http://www.st-and.ac.uk/services/resbus/cgh/accommodation.shtml>

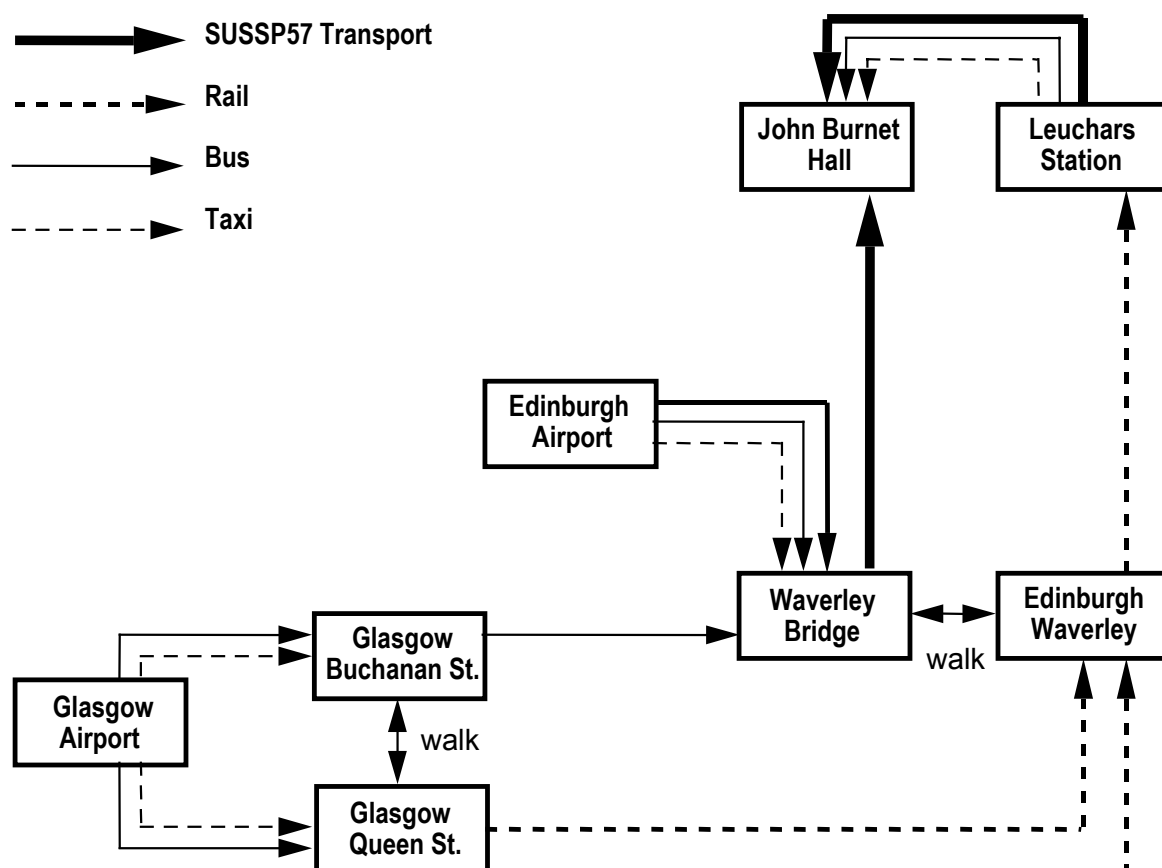
<mailto://holidays@st-andrews.ac.uk>

Tel: 0044 1334 462000

Fax: 0044 1334 462500

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## How to Get to St. Andrews: Schematic Diagram



Use this diagram with the travel information above to plan your journey to St. Andrews. The SUSSP57 coach from Edinburgh Waverley Rail Station and Edinburgh Airport to John Burnet Hall will make only one journey in the late afternoon. The through trains from London Kings Cross will be met at Leuchars where possible, but we cannot guarantee to meet all local services from Edinburgh.

The School Office will be located in Room 233 of the Physics Department. It will be open during the working hours of the school. The school secretary will be Leanne O'Donnell. The telephone number will be 01334 463130 and the fax number 01334 462169. It will also be possible to contact the school on the mobile phone number 07742 054347. Postal communications during the school should be addressed to:

**SUSSP57 School Office (Room 233), School of Physics and Astronomy, University of St Andrews, North Haugh, St Andrews, Fife, KY16 9SS, Scotland**

We look forward to meeting you in St. Andrews,

### The Organising Committee Members

Co-Director:	Professor James Stirling (IPPP, Durham)
Co-Director:	Professor Tony Doyle (University of Glasgow)
Secretary:	Dr Chris Maxwell (IPPP, Durham)
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