

Institute of Physics – London & South East Branch – Retired Members Section
Oxford University Earth Sciences Labs and Clarendon Lab New Beecroft Building
on 26th September 2019

This visit has been organised by John Temple.

Description:

In the morning we shall be shown around the Department of Earth Sciences which has some interesting physics toys (further details below). The Clarendon lab has offered us a free lunch! In the afternoon we shall have a conducted tour of the new state-of-the-art Beecroft Building. There was a REMS visit to the Beecroft Building in May 2017 (during its construction) but now, open and running, it has a totally different flavour.

Timetable:

- 10.30 Meet in foyer of Earth Sciences building (E on map), South Parks Road for tea/coffee
- 11.00 Conducted Tour of the Earth Sciences laboratories
- 12.45 Walk to Clarendon Laboratory (P on map)
- 13.00 Free Buffet Lunch (compliments of Clarendon Lab)
- 14.15 Meet members of Marlborough College Sixth Form
- 14.30 Conducted Tours of the new Beecroft Building
- 16.30 Disperse

Getting there:

By car (See map)

Parking in the city is expensive (typically £6.00 for up to 2 hours) so use P&R (£2.00 for 24 hours)

Caution: Thornhill and Seacourt tend to fill up so try Redbridge, Peartree or Parkway

(See: www.google.co.uk/maps/search/Oxford+Park+and+Ride/@51.7544774,-1.2877579,12z)

Bus No 300 from Redbridge or Peartree; No 500 from Parkway; return fare £2.60; bus passes are valid

Alight at Keble Road (500) or Little Clarendon Street (300) and walk to “E” on South Parks Road

By public transport (See map)

Rail to Oxford or Oxford Parkway then bus 500 to Keble Road and walk to “E” on South Parks Road
(500 runs station to station)

Bus X90, Oxford Tube or National Express to Gloucester Green then walk to “E” on South Parks Road
305 & 505 on the map are bus stops (shown as dots) nearest the labs

Map Key R=Railway Stn; B=Bus Stn; 300 & 500 = Bus stops;
E=Earth Sciences Bldg; P=Physics (Beecroft Bldg)

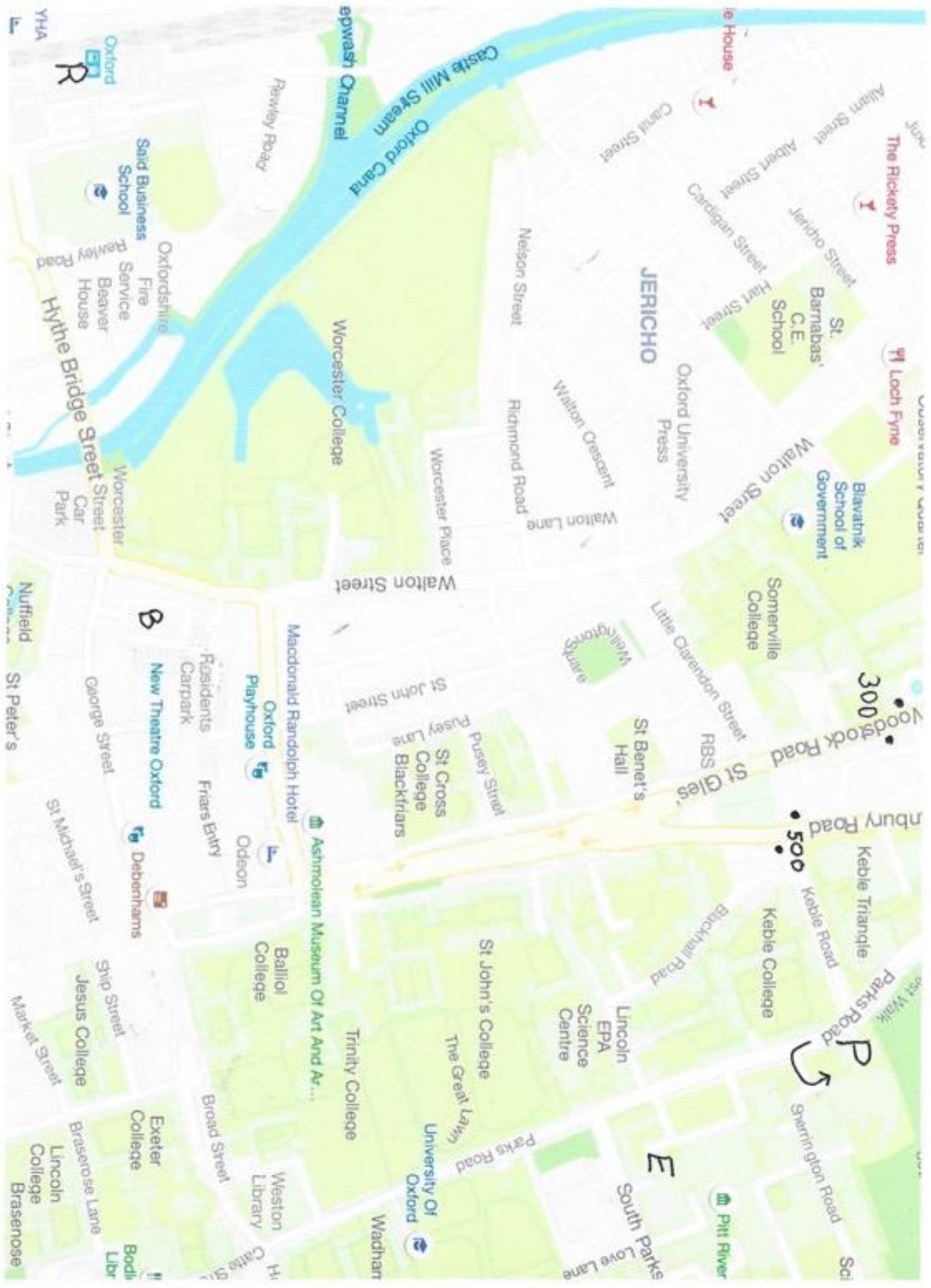
Size of party: Maximum: 24

Cost: £14.00 including a voluntary donation of £10.00 to OXPEG (Oxford Physics Endowment for Graduates)

Booking and payment:

Please request places by e-mailing tonycolclough@outlook.com. To pay: please post a cheque made payable to the Institute of Physics (not IOP) for £14.00 per head to Tony Colclough (REMS), 34 Sugden Road, Thames Ditton, Surrey KT7 0AE.

Contacts: Tony Colclough: at tonycolclough@outlook.com or 020 8398 0766 or 07930 171307; John Temple: 01865 86 1934 or 0777 944 5251 **Late arrivals** Please ring John (0777 944 5251) and wait at Reception in Earth Sciences on arrival.



YHA

Oxford

Said Business School
Oxfordshire Fire Service
Beaver House
Hythe Bridge Street

Worcester College
Worcester Car Park

Nuffield

St Peter's

George Street

St Michael's Street

Market Street
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Exeter College
Lincoln College
Brasenose

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Worcester Car Park

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Earth Science Labs in Oxford

Last November I was shown round the Earth Science Building by my friend, Dr Imad Ahmed. It is fairly new and has a light and open feel to it. The tour started in the basement and ended on the roof.

They have equipment which can only be described as impressive. There is a large workshop. Outside were what looked like giant faceplates and chucks for an enormous woodworking lathe. When I commented on them, he just said, "Oh yes, they were made here". Unfortunately, we couldn't get into the shop itself but we peered through a window.

He told me that he was a chemist rather than a geologist. But I can assure you that most of the equipment in the upper floors was pure physics. There were several mass spectrometers of varying sizes. He told me that they could separate Fe56 from Fe57 with no difficulty. One piece of equipment was so large it had to be hoisted in through the gap after a window had been removed. They forgot to take out the lifting gear (which entered by the same route) before they put the window back, so they just left it there! The spectrometer is one of the only two in the Country. I was pleased to notice that the lifting gear contained a Weston differential. That's old physics, like me.

Another piece of equipment they have can measure impurities in a sample to parts in a billion. I looked at a table of results that were being printed out by a machine that was sampling test tubes of liquids (just like those you see on the tele in Sci Fi films). The column headings of the tables of reading were labelled ppb (parts per billion). But some of the readings had values like 0.067! The last significant figure there surely shows parts per *trillion*! When I pointed that out to Imad, he just laughed.



They have crushing machines they use to prepare powdered samples for analysis. The pressure inside these machines is of the order of 30 bar! Alternatively, they can *vaporize* (plasma-ise?) samples and analyse the plasma. It was only after I'd left that I wished I'd asked how they could tell what element it was if it was in plasma state.

Where does the spectrum come from? How can they tell that it's, say calcium?

They can "look" at a wafer-thin slice of rock by vaporizing a nanometre square of its surface using a laser.

They have a 3D printer. They can and do use it to make prosthetic limbs.

You might ask what all the research is for? Well, pollution is one thing. They've found, in samples of human brain tissue, particles of platinum and silver. Imad showed me a sample of watery sludge to which had been added some chemical (it wasn't carbon) which was purifying the water by adsorption. Sludge had precipitated to the bottom of the phial. Above, the water was crystal clear. He was conducting an experiment to determine the optimum dilution.

Although it was early evening, I noticed there were quite a number of people still working in their labs. And on the top floor, part of which is the roof, there was a group of students chatting over coffee. And the view over the city was fabulous. It would be even better in the daylight.



Beecroft Building

Oxford University's Department of Physics has a new state-of-the-art edifice, the £50m Beecroft Building. REMS members visited it in May 2017 before it was finished. We were shown around by Prof John Wheater, then Head of Physics. The new HoD is Prof Ian Shipsey and we are invited again, to see the finished building now that it is up and running. The visit will follow our morning visit to the Department of Earth Sciences and includes a buffet lunch in the Clarendon Laboratory.



During the visit we will be joined after lunch by a group of sixth formers from Marlborough College with their teacher, himself an alumnus of the Department. This will enable dialogue between the two age groups and hopefully some benefit. The tour will continue with the two groups mixed.



The building was opened in September 2018 by Sir Tim Berners-Lee, inventor and founder of the world-wide web, in the presence of the Chancellor, Lord Chris Patten and the Vice chancellor, Prof Louise Richardson and Sir Adrian Beecroft himself. It extends below ground as much as above and in the very bowels there are huge floating concrete blocks enabling completely almost vibration-free experiments to be carried out. The biggest of these is a massive 65 tonnes! The Department is one of the largest departments of physics in Europe and carries out cutting edge work in both theoretical and experimental physics in topics like optics, quantum technology, lasers, condensed matter. Some of the labs have temperature stability down to $\pm 0.1^\circ\text{C}$. In addition to laboratories it houses studies, offices and spaces where members can meet, relax and discuss ideas in small groups. The whole effect is imposing, thrilling, breath taking and yet quiet and relaxing.

Collaborative dialogue between clients and builders enabled a very ambitious brief to be successfully achieved.

See <https://www.hawkinsbrown.com/projects/the-beecroft-building>.
and/or <https://www.youtube.com/watch?v=OsuMz-Ep7gQ&feature=youtu.be>

Among the former undergraduates of the department are REMS member John Temple (1955-58) and former Cambridge University Lucasian Professor of Mathematics, Stephen Hawking (1959-62). In a building adjoining the Beecroft there is a display cabinet celebrating Stephen Hawking. And in the cupboard next to that may be found John's six inch slide rule which he used when he was here!

A handwritten signature in blue ink, likely belonging to John Temple. The signature is written in a cursive style and is positioned above a horizontal line.