

# Dr. Ian Farrer

Semiconductor Physics Group  
Cavendish Laboratory  
JJ Thomson Avenue  
Cambridge  
CB3 0HE

Tel: 01223 764173 (work)  
07812 160612 (mobile)  
E-mail: if10004@cam.ac.uk  
Date of Birth: 13 June 1975  
Nationality: British

## Employment

2001-present

### Cavendish Laboratory, Postdoctoral Research Worker

- MBE growth of III-V devices on VG-V80H, Varian Gen II and Veeco Gen-III systems
- Wafer structure design, processing and post-growth characterisation
- UHV system maintenance and MBE chamber refurbishment bake turn-around etc.
- Growth of high mobility GaAs/AlGaAs devices for low temperature transport studies
- Continuation of work on self-assembled quantum dots in various material systems
- Growth of Low-Temperature materials for TeraHertz applications
- Growth of high quality structures for optical studies (VECSEL, Cavities, SESAM etc)
- Involved in purchasing, and oversaw the installation of a new 1.5K Helium cryostat system in the MBE characterisation laboratory
- Co-ordinated and liaised with MBE system vendors during a competitive tendering process for a new MBE system costing ~ 1.4M \$, requiring design of full system specification, documentation, costing and negotiation
- Responsible for overseeing installation and preparation of new Veeco Gen-III system
- Achieved world record mobility of 14.9 million for a GaAs/AlGaAs heterostructure on the 3" Gen-III system
- Provide sample growth for SP, TFM and NP groups at the Cavendish, Toshiba Research Europe (Self Assembled Quantum Dot devices), University of Sheffield (Indirect Exciton and Quantum Well devices), University of Southampton (VECSEL structures), University of Bath (Two Dimensional Electron Gases and Low Temperature Gallium Arsenide for THz) amongst others
- Regular attendance and contribution at biennial International MBE conference and yearly UK MBE working party meetings
- Developed good working relationships with several system and component suppliers/manufacturers in the industry

## Education

1997-2001

### Cavendish Laboratory (University of Cambridge), PhD in Semiconductor Physics

*"Growth and Applications of Self-Assembled Quantum Dots"*

- Research into novel devices based on self assembled and strained layer epitaxial growth of III-V semiconductors
- Carried out on a VG-V80H Molecular Beam Epitaxy Machine
- Using both *in-situ* process monitoring of growth (Pyrometry, Reflectometry, RHEED) and *ex-situ* techniques for assessing material quality (DXRD, Photoluminescence) and device performance (Electrical Assessment)
- Assessment of devices is carried out over a temperature range from 1.5K to 300K with the final aim being Room Temperature operation of such novel devices
- Currently part of one of the world's leading research groups in the device field
- Work in collaboration with Toshiba Research Europe Ltd on optical memories and single photon detectors has been published as a result of this research

1993-1997

### Girton College (University of Cambridge), BA(Hons) & MSci in Natural Sciences

Carried out a 3<sup>rd</sup> year project on the investigation of Magnetic Barkhausen Noise in Toroidal Transformer cores at both Room and Liquid Nitrogen Temperatures

Part III	Experimental and Theoretical Physics (with options) (4 <sup>th</sup> year)	2:1
Part II	Experimental and Theoretical Physics	2:1
Part IB	Advanced Physics, Materials Science	1
Part 1A	Physics, Chemistry, Crystalline Materials, Maths (1 <sup>st</sup> year)	2:1

1991-1993	<b><u>St. Mary's RC Sixth Form, Blackburn</u></b> A-Levels: Physics(A), Chemistry(A), Mathematics(A), Further Mathematics(A), Electronic Systems(A) AS-Level: Electronics(A)
1986-1991	<b><u>St. Christopher's CofE High School, Accrington</u></b> GCSEs: 10 at Grade A

## Work Experience

2001-present	<b><u>Part3 Project Supervisor</u></b> <ul style="list-style-type: none"> <li>Supervised 7 final year undergraduate projects focussing on the measurement of two dimensional gases at cryogenic temperatures</li> <li>Resulting in 4 students joining the research group and 2 taking up PhD positions elsewhere</li> </ul>
1999	<b><u>The Research Councils Graduate Schools Programme</u></b> <ul style="list-style-type: none"> <li>5 day intensive course to improve interpersonal and communication skills through case studies, business games and group discussions</li> </ul>
1998-present	<b><u>Girton College/Robinson College/Homerton College/Caius College, Maths Supervising</u></b> <ul style="list-style-type: none"> <li>Taught groups of 2-4 students in weekly sessions</li> <li>Responsible for their academic progress and termly assessment</li> </ul>
1997-2002	<b><u>Cavendish Laboratory, Physics Practical Class Demonstrator</u></b> <ul style="list-style-type: none"> <li>Required to monitor the progress of a group of students throughout the session, intervening where necessary to provide moral or practical support to ensure the class is an enjoyable learning experience</li> </ul>
1996	<b><u>Smurfit Paper and Board Mills, Burnley</u></b> <ul style="list-style-type: none"> <li>Implemented a Risk Assessment and Monitoring Programme within the mill for substances which come under the COSHH regulations</li> <li>Created a simple database system to handle employee reporting of the measurement</li> </ul>

## Skills

Computing	Familiar with DOS, Windows and Unix operating systems. Good knowledge of Microsoft Office packages. Basic grounding in C and FORTRAN programming languages
Languages	Basic French and GCSE German(A)
Other	Full clean UK Driving Licence

## Selected Publications

Total of 215 publications to date: h-index 20; 1472 citations overall (from Web of Knowledge)

### On-demand single-electron transfer between distant quantum dots

McNeil, R.P.G.; Kataoka, M.; Ford, C.J.B.; et al.  
Nature, Volume : 477 Issue: 7365 Pages: 439-442 Published 2011

### Exciton-Spin Memory with a Semiconductor Quantum Dot Molecule

Boyer de la Giroday A.; Skoumld N.; Stevenson R.M.; et al.  
Physical Review Letters, Volume: 106 Issue: 21 Pages: 216802 Published 2011

### Tunable polaritonics at room temperature with strongly coupled Tamm Plasmon polaritons in metal/air-gap microcavities

Grossmann C.; Coulson C.; Christmann G.; et al.  
Applied Physics Letters, Volume: 98 Issue: 23 Article: 231105 Published 2011

### An entangled-light-emitting diode

Salter, CL; Stevenson, RM; Farrer, I; et al.  
Nature, Volume: 465 Issue: 7298 Pages: 594-597 Published: 2010

### A passively mode-locked external-cavity semiconductor laser emitting 60-fs pulses

Quarterman, AH; Wilcox, KG; Apostolopoulos, V; et al.  
Nature Photonics, Volume: 3 Issue: 12 Pages: 729-731 Published: 2009

MBE growth and patterned backgating of electron-hole bilayer structures

Farrer, I; Croxall, AF; Das Gupta, K; et al.

Journal of Crystal Growth, Volume: 311 Issue: 7 Pages: 1988-1993 Published: 2009

Ultrafast optical Stark mode-locked semiconductor laser

Wilcox, KG; Mihoubi, Z; Daniell, GJ; et al.

Optics Letters, Volume: 33 Issue: 23 Pages: 2797-2799 Published: 2008

Substrate temperature measurement using a commercial band-edge detection system

Farrer, I; Harris, JJ; Thomson, R; et al.

Journal of Crystal Growth, Volume: 301 Pages: 88-92 Published: 2007

Conductance quantization at a half-integer plateau in a symmetric GaAs quantum wire

Crook, R; Prance, J; Thomas, KJ; et al.

Science, Volume: 312 Issue: 5778 Pages: 1359-1362 Published: 2006

Daily calibration of InAs growth rates using pyrometry

Farrer, I; Ritchie, DA

Journal of Crystal Growth, Volume: 278 Issue: 1-4 Pages: 473-477 Published: 2005

Erasable electrostatic lithography for quantum components

Crook, R; Graham, AC; Smith, CG; et al.

Nature, Volume: 424 Issue: 6950 Pages: 751-754 Published: AUG 14 2003