Programme for UKNC Conference, Cambridge

6th-7th January 2016

Meeting location

The conference will be held in Robinson College, Grange Road, Cambridge, CB3 9AN.
A link to their website is ...
http://www.robinson.cam.ac.uk/conferences-robinson

Extensive directions to the college are available at ...
http://www.robinson.cam.ac.uk/contact-us/visiting-robinson/directions

On arrival delegates should go to the dining hall balcony for coffee and to collect badges. All talks will be held in the Auditorium.

A map of the venue's location is shown at the end of this document.

Wednesday 6th Jan.

10.15-10.40: Arrival/Registration (dining hall balcony)

10.40-10.45
Introductory remarks: Tom Foxon, Ted Thrush, Rachel Oliver

10.45-11.00
Multi-Microscopy Techniques for the Investigation of Fully Coalesced Boundaries in GaN
T.J. O'Hanlon, F.C.-P. Massabuau and R.A. Oliver
Department of Materials Science and Metallurgy, University of Cambridge

11.00-11.15
Nanoscale Tomography of III-nitride devices: Correlating Material Effects and Device Properties
F. Tang[1], C.X. Ren[1], D. Wang[2], G. Divitni[1], T. Zhu[1], E. Hu[2] and R. A. Oliver[1]
[1] Department of Materials Science and Metallurgy, University of Cambridge
[2] School of Engineering and Applied Sciences, Harvard University, Cambridge, MA, 02138, USA

11.15-11.30

Room temperature PL efficiency of InGaN QW structures with prelayers as a function of the number of QWs and QW barrier width

G.M. Christian[1], S. Hammersley[1], M.J. Davies[1], P. Dawson[1], M.J. Kappers[2], F.C.-P. Massabuau[2], R.A. Oliver[2] and C.J. Humphreys[2]

[1] Photon Science Institute & School of Physics and Astronomy, University of Manchester

[2]Department of Materials Science and Metallurgy, University of Cambridge

11.30-11.45

Observation of efficiency droop in non-polar InGaN/GaN quantum wells

S. Hammersley[1], M.J. Davies[1], M.J. Kappers[2], P. Dawson[1], C.J. Humphreys[2] and R.A. Oliver[2]

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[2]Department of Materials Science and Metallurgy, University of Cambridge

11.45-12.00

Investigating efficiency droop in InGaN/GaN quantum well structures using ultrafast time-resolved terahertz and photoluminescence spectroscopy

Aniela Dunn [1], Ben. F. Spencer [1], Samantha J. O. Hardman [2], Darren M. Graham [1], Simon Hammersley [1], Matthew J. Davies [1], Phil Dawson [1], Menno J. Kappers [3], Rachel A. Oliver [3], and Colin J. Humphreys [3]

[1] School of Physics and Astronomy, University of Manchester

[2] Manchester Institute of Biotechnology, University of Manchester

[3] Department of Materials Science and Metallurgy, University of Cambridge

12.00-12.15

The last bound barrier state model for LEDs

M. Pristovsek[1], T. Zhu[1], Y. Han[1,3], F. Oehler[1,2], R.A. Oliver[1], C.J. Humphreys[1], S. Bauer[4], M. Knab[4], K. Thonke[4], G. Kozlowski[5], D. O'Mahony[5], P. Maaskant[5] and Brian Corbett[5]

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[5] Tyndall National Institute, Cork, Ireland

12.15-12.30

Electron backscattered diffraction and electron channelling contrast imaging of a cross-section semi-polar GaN on a patterned r-sapphire substrate

G. Naresh-Kumar[1], A.V. Clemente[2], C. Trager-Cowan[1] , A. J. Wilkinson[2], F. Tendille[3], P. de Mierry[3] and P. Vennegues[3]

[1] Department of Physics, SUPA, University of Strathclyde, Glasgow

[2] Department of Materials, University of Oxford

[3] CNRS-CRHEA, rue Bernard Grégory, Sophia-Antipolis, F-06560 Valbonne, France

12.30-13.30: Lunch (Dining Hall)

13.30-14.45: Posters (Dining Hall)

14.45-15.00

Linearly polarised photon emission at 160 K from single non-polar (11-20) InGaN quantum dots embedded in nanopillar structures

T. Wang[1], T.J. Puchtler[1], T. Zhu[2], M. Ali[3], T. Badcock[3], T. Ding[2,4], R.A. Oliver[2] and R.A. Taylor[1]
[1] Department of Physics, University of Oxford
[2] Department of Materials Science and Metallurgy, University of Cambridge
[3] Nanophotonics Centre, Cavendish Laboratory, University of Cambridge
[4] Cambridge Research Laboratory, Toshiba Research Europe Limited

15.00-15.15

Polarized White Light Emission From Hybrid Organic / III-nitrides Grating Structures

M. Athanasiou, R. Smith, S. Ghataora and T. Wang
Department of Electronic and Electrical Engineering, University of Sheffield

15.15-15.30

Metastable and quasistable Eu3+ defects in GaN(Mg)

K.P. O'Donnell[1], P.R. Edwards[1], M. Yamaga[2], K. Lorenz[3], M.J. Kappers[4] and M. Boćkowski[5]
[1] SUPA Department of Physics, University of Strathclyde Glasgow
[2] Department of Mathematical and Design Engineering, Gifu University,Gifu 501-1193, Japan
[3] IST, Universidade de Lisboa, CTN, Estrada Nacional 102695-066 Bobadela LRS Portugal
[4] Department of Materials Science and Metallurgy, University of Cambridge
[5] Institute of High Pressure Physics PAS, Sokolowska 29/37, 01-142 Warsaw, Poland

15.30-16.00: Tea (Dining Hall)

16.00-16.45

Unraveling the bandgap nature of hexagonal boron nitride (invited)

G. Cassabois
Laboratoire Charles Coulomb, CNRS, Montpellier University, France

16.45-17.00

Band gap engineering in II-IV nitrides

M. Råsander, J.B. Quirk and M.A. Moram
Department of Materials, Imperial College London

17.00-17.15

Kinetic phase diagrams and universality in nitride surface patterning during growth

B. Hourahine
The University of Strathclyde, Glasgow

17.15-17.30

Terahertz dielectric properties of free-standing non-polar GaN

M.T. Hibberd[1], V. Frey[1], A.A. Roble[1], B.F. Spencer[1], P. Mitchell[1], D.M. Graham[1], M.J. Kappers[2], R.A. Oliver[2] and C.J. Humphreys[2]
[1] School of Physics and Astronomy, University of Manchester
[2] Department of Materials Science and Metallurgy, University of Cambridge

17.30-17.45
Temperature dependent bandgap and bowing parameter of indium-aluminium nitride
S.N. Alam, V.Z. Zubialevich, D.V. Dinh and P.J. Parbrook
[1] Tyndall National Institute, University College Cork, Ireland
[2] School of Engineering, University College Cork, Ireland

17.45-18.30: AGM (Auditorium Lounge)

The bar will be open from 17.00 to 23.00

19.30: Dinner (Dining Hall)

Thursday 7th Jan.

7.30-8.45: Breakfast (Garden Restaurant)

9.00-9.15
Evolution of the m-plane Quantum Well Morphology within a GaN/InGaN Core-Shell Structure
P.-M. Coulon[1], S. Hosseini Vajargah[2], S.-L. Sahonta[2], E.D. Le Boulbar[1], I. Gîrgel[1], R.A. Oliver[2], C.J. Humphreys[2], D.W.E. Allsopp[1] and P.A. Shields[1]
[1] Department of Electronic and Electrical Engineering, University of Bath
[2] Department of Materials Science and Metallurgy, University of Cambridge

9.15-9.30
Selective etching of n-type GaN in InGaN/GaN quantum disc nanorod arrays using electrode-less photo-electrochemical etching
C.J. Lewins, S.A. Fox, A. Sergejevs, P.A. Shields, and D.W.E. Allsopp
Department of Electronic and Electrical Engineering, University of Bath

9.30- 9.45
Carrier Transport in MOVPE-grown Si:AlGaN material with high aluminum content
P. Pampili[1,2], D.V. Dinh[1], V.Z. Zubialevich[1] and P.J. Parbrook[1,2]
[1] Tyndall National Institute, University College Cork, Ireland
[2] School of Engineering, University College Cork, Ireland

9.45-10.30
III-Nitride Tunnel Junctions for Next-Generation Visible and Ultraviolet Optoelectronics (invited)
Siddharth Rajan , Sriram Krishnamoorthy, Fatih Akyol, Yuewei Zhang
Electrical & Computer Engineering, The Ohio State University, Columbus, Ohio, USA

10.30-11.00: Coffee (Dining Hall)

11.00-11.15
A confocal photoluminescence investigation of basal plane stacking faults (BSFs) in (11-22) semi-polar InGaN/InGaN quantum wells on overgrown semi-polar GaN
R.M. Smith, Y. Zhang, J. Bai, K. Xing, X. Yu, B. Xu, Y. Gong, M. Athanasiou, Y. Hou and T. Wang
Department of Electronic and Electrical Engineering, University of Sheffield

11.15-11. 30

(11-22) semipolar InGaN emitters from green to amber overgrown on GaN micro-rod templates

Y. Zhang, J. Bai, B. Xu, K. Xing, X. Yu, Y. Gong, Y. Hou, and T. Wang
Department of Electronic and Electrical Engineering, University of Sheffield

11.30-11.45

Fast colour conversion of InGaN sources using semiconductor nanocrystals

J.M. Santos[1], M. Leitao[1], C. Foucher[1], S. Rajbhandari[2], H. Chun[2], D. Vithanage[3], B. Guihabert[1], G.A. Turnbull[3], I.D.W. Samuel[3], G. Faulkner[2], D. O'Brien[2], N. Laurand[1] and M.D. Dawson[1]
[1] Institute of Photonics, Department of Physics, University of Strathclyde, Glasgow, G1 1RD, UK
[2] Department of Engineering Science, University of Oxford
[3] School of Physics and Astronomy, University of St Andrews

11.45-12.00

Structured illumination by high-speed micro-LED arrays for imaging and LiFi

J. Herrnsdorf, M.J. Strain, E. Gu and M.D. Dawson
Institute of Photonics, Department of Physics, University of Strathclyde, Glasgow

12.00-12.15

1 Gb/s Integrated Visible Light Communication System Comprising CMOS drivers, receivers and GaN micro-LEDs

J.J.D. McKendry[1], S. Rajbhandari[2], H. Chun[2], G. Faulkner[2], K. Cameron[3], A.V.N. Jalajakumari[3], R.K. Henderson[3], D.Tsonev[4], M. Ijaz[4], Z. Chen[4], H. Haas[4], E. Xie[1], J. Herrnsdorf[1], E. Gu[1], M.D. Dawson[1] and D. O'Brien[2]
[1] Institute of Photonics, Department of Physics, University of Strathclyde, Glasgow
[2] Department of Engineering Science, University of Oxford
[4] Institute for Digital Communications, Li-FI R&D Centre, The University of Edinburgh

12.15-12.30

Electrical Characterization of AlGaN/GaN and SiC using Non-Contact Corona-Kelvin Metrology

A. Findlay[1], J. Lagowski[1], M. Wilson[1], A. Savtchouk[1] and Bob Hillard[2]
[1] Semilab SDI, LLC - 10770 N. 46th St., E700, Tampa, Florida, USA
[2] Semilab USA, LLC – 101 Billerica Ave, Building 5 Suite 105, North Billerica, MA, USA

12.30-13.30: Lunch (Dining Hall. Posters will be on display).

13.30-13.45

Uniformity and robustness of GaN-on-diamond wafer thermal properties for ultra-high power density transistor applications

J.W. Pomeroy, H. Sun, J. Anaya and M. Kuball
University of Bristol

13.45-14.00

Development of an atomic layer etch process via repeated cycling of chloride formation in chlorine gas and its argon plasma removal for precision nanometer scale thin layer etch in GaN-based power device fabrications

X. Li[1], K. Floros[1], S.-J. Cho[1], I. Guiney[2], D. Moran[1] and I.G. Thayne[1]
[1] University of Glasgow
[2] Department of Materials Science and Metallurgy, University of Cambridge

14.00-14.15
Subthreshold mobility in AlGaN/GaN HEMTs
W. Waller[1], M.J. Uren[1], K.B. Lee[2], P.A. Houston[2], I. Guiney[3], D.J. Wallis[3] and M. Kuball[1]
[1] *CDTR, H H Wills Physics Laboratory, University of Bristol,* Senate House, Tyndall Ave, Bristol, City of Bristol BS8 1TH, UK
[2] *Department of Electronic and Electrical Engineering, University of Bath*
[3] *Department of Materials Science and Metallurgy, University of Cambridge*

14.15-14.30
Terahertz magnetospectroscopy studies of an AlGaN/GaN heterostructure
B.F. Spencer[1], M.T. Hibberd[1], W.F. Smith[1], P. Dawson[1], D.M. Graham[1], M. Beck[2], A. Bartels[2], I. Guiney[3], M.J. Kappers[3], R.A. Oliver[3] and C.J. Humphreys[3]
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[2] *Laser Quantum GmbH, Max-Stromeyer-Str. 116, 78467 Konstanz, Germany*
[3] *Department of Materials Science and Metallurgy, University of Cambridge*

14.30-14.45
Buffer Investigations on Substrate Biased AlGaN/GaN HFETs: An Overview
A. Pooth[1,2], T. Martin[2], M.J. Uren[1] and M. Kuball[1]
[1] *University of Bristol*
[2] *IQE, St Mellons, Cardiff*

14.45-15.00
Simulation of Dynamic RON Dispersion in GaN Power Transistors
M.J. Uren and M. Kuball
University of Bristol

15.00-15.30: Tea (Dining Hall)

15.30-15.45
Reduced Hysteresis in E-mode AlGaN/GaN Metal-Semiconductor-Insulator (MIS)HEMT after in-situ N2 plasma pre-treatment
Z.H. Zaidi[1], K.B. Lee[1], J.W. Roberts[2], S. Jiang[1], I. Guiney[3], H. Qian[1], D.J. Wallis[3], C.J. Humphreys[3], P.R. Chalker[2] and P.A. Houston[1]
[1] *Department of Electronic and Electrical Engineering, University of Sheffield*
[2] *Centre for Materials and Structures, University of Liverpool*
[3] *Department of Materials Science and Metallurgy, University of Cambridge*

15.45-16.00
All GaN Integrated Cascode Heterojunction Field Effect Transistors
S. Jiang[1], K.B. Lee[1], I. Guiney[2], P.F. Miaja[3], Z.H. Zaidi[1], H. Qian[1], D.J. Wallis[2], A.J. Forsyth[3], C.J. Humphreys[2] and P.A. Houston[1]
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[2] *Department of Materials Science and Metallurgy, University of Cambridge*
[3] *School of Electrical and Electronic Engineering, University of Manchester*

16.00-16.45
Recent Advances in High Voltage GaN Power Devices and ICs (invited)
T. Paul Chow
Rensselaer Polytechnic Institute, Troy, NY 12180, USA

16.45-16.50: Concluding remarks

Acknowledgements
The UKNC conference organisers gratefully acknowledge the sponsorship of the Institute of Physics (IOP).

Posters

1
GaN deposition on Rare Earth Oxide on Silicon
B. Ding, L.Y. Lee, I. Guiney and R.A. Oliver
Department of Materials Science and Metallurgy, University of Cambridge

2
Structural and morphological characterisation of gallium nitride grown on SiC on Si substrates
L.Y. Lee[1], M. Frentrup[1], S.-L. Sahonta[1], M.J. Kappers[1], L.J. Shaw[2], P.J. Ward[2], C.J. Humphreys[1], R.A. Oliver[1] and D.J. Wallis[1]
[1] *Department of Materials Science and Metallurgy, University of Cambridge*
[2] *Anvil Semiconductors Ltd,* Allesley*, Coventry*

3
Spectroscopic studies of cubic GaN grown on Si/SiC by metal organic chemical vapour-phase deposition
S. Church[1], M. Davies[1], P. Mitchell[1], D. Binks[1], P. Dawson[1], C.J. Humphreys[2], R.A. Oliver[2], M.J. Kappers[2], P.J. Ward[3], L.J. Shaw[3] and D.J. Wallis[2]
[1] *School of Physics and Astronomy, University of Manchester*
[2] *Department of Materials Science and Metallurgy, University of Cambridge*
[3] *Anvil Semiconductors Ltd,* Allesley, *Coventry*

4
Microstructure of Cubic InGaN Epilayers and Multiple Quantum Well Structures Grown on 3C-SiC (001) Substrates
S.-L. Sahonta[1] , M. Kappers[1], M. Frentrup[1], R.A. Oliver[1], L.J. Shaw[2], P. Ward[2], C.J. Humphreys[1] and D.J. Wallis[1]
[1] *Department of Materials Science and Metallurgy, University of Cambridge*
[2] *Anvil Semiconductors Ltd*, Allesley, *Coventry*

5
Structural Studies of Large-Area Thick AlGaN(0001) Films grown on GaAs (111)B Substrates
S.-L. Sahonta[1], R.A. Oliver[1], C.J. Humphreys[1], C.T. Foxon[2] and S.V. Novikov[2]
[1] *Department of Materials Science and Metallurgy, University of Cambridge*
[2] *School of Physics and Astronomy, University of Nottingham*

6

Raman Spectroscopy of cubic GaN grown on SiC/Si by metal organic chemical vapour-phase deposition

P.W. Mitchell[1], D. Binks[1], P. Dawson[1], C.J. Humphreys[2], R.A. Oliver[2], M.J. Kappers[2], P.J. Ward[3], L.J. Shaw[3] and D.J. Wallis[2]

[1] Photon Science Institute & School of Physics and Astronomy, University of Manchester,

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7

3D characterisation of novel GaN structures using Raman spectroscopy

Tim Batten[1], Emmanuel Le Boulbar[2],Duncan Allsopp[2], Philip Shields[2]

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[2] Department of Electronic and Electrical Engineering, University of Bath

8

Effect of Growth Temperature on the Internal Quantum Efficiency of InGaN/GaN Quantum Well Structures

S. Hammersley[1], M.J. Kappers[2], F.C.-P. Massabuau[2], S.-L. Sahonta[2], P. Dawson[1], R.A. Oliver[2] and C.J. Humphreys[2]

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9

The effects of an electron blocking layer on recombination in multiple quantum well light emitting diodes

S. Hammersley[1], P. Dawson[1], M.J. Kappers[2], R.A. Oliver[2] and C.J. Humphreys[2]

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10

Identification of loss mechanisms in GaN based Light Emitting Diodes

K. Cavanagh[1], C. Liu[2], T. Martin[3], S. Sivaraya[1], M.A. Hopkins[1], D.W.E Allsopp[1]

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[2] IQE-NanoGaN, Department of Electrical and Electronic Engineering, University of Bath

[3] IQE, St Mellons, Cardiff

11

A study of defect-related effects in InGaN/GaN LEDs and their impact on efficiency

M.A. Hopkins[1], M.J. Kappers[2], E.J. Thrush[2], A. Philips[2], R.A. Oliver[2], C.J. Humphreys[2] and D.W.E. Allsopp[1]

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12

Fabrication of nanostructured III-N growth templates using Displacement Talbot Lithography and Nanoimprint Lithography

E.D. Le Boulbar and P.A. Shields

Department of Electronic and Electrical Engineering, University of Bath

13

Properties of GaN Nanowires with ScxGa1-xN Insertion

A. Bao[1], L.E. Goff[2], T. Zhu[1], S-L. Sahonta[1], M. Frentrup[1], H.J. Joyce[3] and R.A. Oliver[1]
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[2] Department of Physics, University of Cambridge
[3] Department of Engineering, University of Cambridge

14

GaN Nanowires Grown on (111) Si Substrate by MOVPE

X. Yu[1], S. Shen[1], Y. Hou[1], Y. Gong[1], A. Hazari[2], P. Bhattacharya[2] and T. Wang[1]
[1] Department of Electronic and Electrical Engineering, University of Sheffield
[2] University of Michigan, 500 S State St, Ann Arbor, MI 48109, USA

15

Characterisation of GaNAs/GaN PN junction diode with scanning probe microscopy

F.S. Choi[1], S. Hosseini Vajargah[1], S. Zhang[1], J. Griffiths[1], S.V. Novikov[2], I. Guiney[1], D.J. Wallis[1], C.T. Foxon[2], R.A. Oliver[1] and C.J. Humphreys[1]
[1] Department of Materials Science and Metallurgy, University of Cambridge
[2] School of Physics and Astronomy, University of Nottingham

16

Nanocathodoluminescence reveals the mitigation of the Stark shift in InGaN quantum wells by silicon doping

J.T. Griffiths[1], S. Zhang[1], B. Rouet-Leduc[1], W.Y. Fu[1], A. Bao[1], D. Zhu[1,2], D. Wallis[1,2], A. Howkins[3], I. Boyd[3], D. Stowe[4], M.J. Kappers[1], C.J. Humphreys[1] and R.A. Oliver[1]
[1] Department of Materials Science and Metallurgy, University of Cambridge
[2] Plessey Semiconductor Limited, Roborough, Plymouth
[3] Experimental Techniques Centre, Brunel University London
[4] Gatan, Abingdon

17

Investigation of Directional Light Emission from InGaN/GaN Vertical Light Emitting Diodes using Ordered Nanorod Arrays

S.A. Fox[1], S.M. Lis[1], P.A. Shields[1], D.J. Wallis[2], G. Thompson[3], J. Sarma[1] and D.W.E. Allsopp[1]
[1] Department of Electronic and Electrical Engineering, University of Bath
[2] Plessey Semiconductor Limited, Roborough, Plymouth
[3] Digital Projection Limited, Manchester

18

Time dependence of cathodoluminescence from InGaN quantum dots grown on non-polar a-plane GaN

J.C. Jarman, T. Zhu, R.A. Oliver and W.Y. Fu
Department of Materials Science and Metallurgy, University of Cambridge

19

Ultraviolet emission from GaN-based metal-insulator-semiconductor diodes

C. Lin[1], K. Kavanagh[2], L. Tsui[1], M.J. Kappers[3], D. Allsopp[2] and M.A. Moram[1]
[1] Department of Materials, Imperial College London
[2] Department of Electronic and Electrical Engineering, University of Bath
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20

Growth of GaN Epitaxial Films on Polycrystalline Diamond with Metal-organic Vapour Phase Epitaxy via a SixC Layer

Q. Jiang[1], D.W.E. Allsopp[1] and C.R. Bowen[2]

[1] Department of Electronic and Electrical Engineering, University of Bath

[2] Department of Mechanical Engineering, University of Bath

21

Electrical characterisation of InAlN/AlGaN/GaN HEMT on Si substrate with varying InAlN thickness

K. Floros[1], X. Li[1], I. Guiney[2], S.J. Cho[1], G. Ternent[1], D. Hemakuma[1], O. Ignatova[1], D.A.J. Moran[1], E. Wasige[1], C.J. Humphreys[2] and I.G. Thayne[1]

[1] University of Glasgow

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22

High Temperature Performance of 600 V GaN/AlGaN/GaN Heterostructure Field Effect Transistors on Silicon Substrates

K.B. Lee[1], S. Jiang[1], Z.H. Zaidi[1], H. Qian[1], I. Guiney[2], D.J. Wallis[2], C.J. Humphreys[2] and P.A. Houston[1]

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23

Characterization of amorphous and polycrystalline p-GaN1-xAsx / n-GaN diodes

H. Qian[1], K.B. Lee[1], S. Hosseini Vajargah[2], S.V. Novikov[3], I. Guiney[2], Z.H. Zaidi[1], S. Jiang[1], D.J. Wallis[2], C.T. Foxon[3], C.J. Humphreys[2] and P.A. Houston[1]

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[3] School of Physics and Astronomy, University of Nottingham

Map showing location of Robinson College