

## Dr Chris Hawkes MA, DPhil

Senior Lecturer

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### About

Chris Hawkes is an experimental particle physicist, who has specialised in making precision tests of the Standard Model of Particle Physics. This includes measurements of quark-flavour physics and CP-violating interactions in decays of B meson particles (BaBar experiment, 1998-2009) and measurements of properties of the electroweak gauge bosons, Z and W (OPAL and MarkII experiments, 1985-2000). These allow stringent tests of our understanding of elementary particle interactions at the level of higher-order loop corrections in quantum field theory.

He is currently working on the ATLAS experiment at the Large Hadron Collider, with an interest in the physics of top and heavy flavour quarks.

### Qualifications

- DPhil in Experimental Particle Physics, Oxford, 1985
- MA, Cambridge, 1985
- Certificate of Advanced Study in Mathematics, Cambridge, 1982
- BA, Cambridge, 1981

### Biography

#### ATLAS Experiment (2009-present)

ATLAS is one of the main general-purpose experiments collecting data at the Large Hadron Collider at CERN. Chris Hawkes coordinates the Birmingham top and heavy flavour physics group.

#### BaBar Experiment (1998-2009)

BaBar was an experiment to study the difference between the properties of matter and antimatter (CP violation). It was based at the Stanford Linear Accelerator Center (SLAC) in California. A deeper comprehension of CP violation is a major goal of modern particle physics, in part because this is necessary to understand why the universe is dominated by matter, with hardly any antimatter remaining from the Big Bang. BaBar recorded the decays of about half a billion B particles, each accompanied by the decay of an anti-B particle. By measuring and contrasting the B and anti-B properties it was possible to investigate CP violation.

Chris Hawkes led the Birmingham BaBar Group, which in collaboration with other BaBar-UK groups studied charmless three-body B decays, an important class of rare B decays that was crucial to BaBar's overall programme of B physics. Analysis of the three-body final state (Dalitz-plot analysis), allowed a study of the B decay mechanisms at the amplitude level, leading to a probe of the quantum interference between different decay paths, which is sensitive to the CP violation involved. Results were published from several different charmless three-body B decay channels.

#### OPAL Experiment

OPAL was one of four experiments based at the Large Electron Positron (LEP) collider at CERN, which collected data from 1989-2000. OPAL studied a wide range of particle physics topics, but its main goal, and Chris Hawkes' area of specialisation, was precise measurement of the properties of the electroweak gauge bosons, Z and W, which are responsible for mediating the weak interaction. These provide a highly significant and sensitive probe of higher-order electroweak corrections. He contributed in particular to measurements of the mass and decay width of the Z boson, both from analysis of OPAL data and also through the LEP Energy Group, who were responsible for calibrating the LEP beam energy, the limiting factor in determination of the Z mass. Chris Hawkes was OPAL's Physics Coordinator for a year in 1994-5.

- University of Birmingham, (1998-)
- PPARC Advanced Fellow, University of Cambridge, 1995-1998
- Fellow and Staff Physicist, CERN, Geneva, Switzerland, 1989-1995
- Research Fellow, California Institute of Technology, Pasadena, USA, 1985-1989
- Postgraduate student, University of Oxford, 1982-1985

### Teaching

- 2nd year Quantum Mechanics 2
- 4th year Experimental Particle Physics Techniques
- 4th year Particle Physics projects
- 2nd year tutor
- Programme coordinator for Physics with Particle Physics and Cosmology

## Postgraduate supervision

Currently supervising two particle physics PhD students.

Previously supervised four particle physics PhD students who have now graduated.

## Research

### RESEARCH THEMES

Experimental particle physics. See biography for details.

### RESEARCH ACTIVITY

- ATLAS experiment (2009-present)
- BaBar experiment (1998-2009)
- OPAL experiment (1989-2001)
- MarkII experiment (1985-1989)
- TASSO experiment (1982-1985)

## Other activities

- Member of CERN's Large Hadron Collider Committee (LHCC) and chief referee of the LHC Computing Grid project (2008-present)
- Referee for journals Physical Review Letters and Physical Review D (1995-present)

## Publications

Publications from each of my recent experiments are listed at the following external web sites:

### ATLAS experiment

- **[Publications of the ATLAS collaboration \(https://twiki.cern.ch/twiki/bin/view/AtlasPublic/WebHome#Publications\\_of\\_the\\_ATLAS\\_collab\)](https://twiki.cern.ch/twiki/bin/view/AtlasPublic/WebHome#Publications_of_the_ATLAS_collab)**

### BaBar experiment

- **[BaBar publications \(https://oraweb.slac.stanford.edu/pls/slacquery/babar\\_documents.startup\)](https://oraweb.slac.stanford.edu/pls/slacquery/babar_documents.startup)**

### OPAL experiment

- **[Opal publications \(http://opal.web.cern.ch/Opal/pubs/paper/index.html\)](http://opal.web.cern.ch/Opal/pubs/paper/index.html)**

