

Adam Morris

Curriculum Vitae

Personal statement

I am a PhD student with the LHCb group at the University of Edinburgh. My research experience is in studies of four-body charmless hadronic decays of B mesons.

Education

PhD in experimental particle physics

2013 — 2017

University of Edinburgh

Thesis title *Measurements of charmless B_s meson decays at LHCb*
Supervisors Matthew Needham and Franz Muheim

MSci in physics

2009 — 2013

University of Birmingham

Thesis title *A possible lepton flavour violation search at NA62*
Supervisors Cristina Lazzeroni and Evgueni Goudzovski
Classification 2:1

Physics analysis

Amplitude analysis of $B_s^0 \rightarrow \phi K^+ K^-$ decays

2015 — 2017

An amplitude fit to $B_s^0 \rightarrow \phi K^+ K^-$ events with $m(K^+ K^-) < 1.8$ GeV, in which the first observation of the decay $B_s^0 \rightarrow \phi f_2'(1525)$ is made, and its branching fraction and longitudinal polarisation fractions are measured.

This is my primary thesis work, and I was responsible for performing the analysis, from selection, modelling the acceptance, signal and background, fitting the data and calculating results and systematic uncertainties. The amplitude fit was performed using Edinburgh's RapidFit fitting framework, which I modified to make more suited to the task. The PDF was adapted from the $B^0 \rightarrow \psi(2S) K^+ \pi^-$ analysis, and extended to become extensively runtime-configurable, allowing many versions of the fit to run simultaneously on a HPC cluster without the need to re-compile.

Measurement of the $B_s^0 \rightarrow \phi\phi$ branching fraction and search for $B^0 \rightarrow \phi\phi$

2014 — 2015

The $B_s^0 \rightarrow \phi\phi$ branching fraction was measured using $B^0 \rightarrow \phi K^{*0}$ for normalisation, resulting in a factor of five reduction in the statistical uncertainty compared to the previous best result. This is an important normalisation channel for charmless B decay measurements, such as $B_s \rightarrow \phi \pi^+ \pi^-$. In addition, a search was performed for the suppressed $B^0 \rightarrow \phi\phi$ decay, and an upper limit placed on its branching fraction, which is a factor of seven improvement compared to the previous best result.

This analysis forms part of my thesis work, and I was responsible for the mass fits and most of the calculations of efficiencies and systematics, as well as setting the limit on the B^0 mode using the CL_s method.

Measurement of CP violation in $B_s^0 \rightarrow \phi\phi$ decays

2013 — 2014

A time-dependent angular fit performed to $B_s^0 \rightarrow \phi\phi$ events to extract the weak phase ϕ_s , which is expected to be close to zero due to cancellation between the leading-order mixing and decay diagrams.

I was responsible for parametrising the peaking backgrounds and performing fits to the $\phi\phi$ invariant mass.

Hardware and operations

LHCb control room shifts	2015 — 2016
RICH piquet shifts	2015 — 2016
Ion feedback monitoring of the RICH HPDs	2015 — 2016
RICH upgrade testbeam	2014 — 2016
Performance of MaPMTs in magnetic fields for the RICH upgrade	2013 — 2014

Schools, workshops and conferences

Exotic hadron spectroscopy workshop	University of Edinburgh, September 2016
Heavy Quarks and Leptons (HQL) conference	Virginia Tech, May 2016
Talk: <i>Charmless b-meson and b-baryon decays at LHCb</i>	
LHCC Poster Session	CERN, March 2016
Poster: <i>Measurement of the $B_s \rightarrow \phi\phi$ branching fraction and angular analysis of $B_s \rightarrow \phi\pi^+\pi^-$ at LHCb</i>	
UK HEP forum: “Anomalies and Deviations” workshop	STFC, Abingdon, November 2015
Poster: <i>Measurement of the $B_s \rightarrow \phi\phi$ branching fraction and search for $B^0 \rightarrow \phi\phi$ at LHCb</i>	
European School of High-Energy Physics	Bansko, Bulgaria, September 2015
Young Experimentalists and Theorists Institute (YETI) workshop	Durham University, January 2015
B-physics at frontier machines (Beauty) conference	University of Edinburgh, July 2014
Poster: <i>Measurement of CP violation in $B_s^0 \rightarrow \phi\phi$ decays</i>	
STFC HEP summer school	University of Warwick, September 2014

Public outreach

Participant in an ‘Ask Me Anything’ session organised by the CERN Press Office on <i>reddit.com</i>	May 2015
Participant in a <i>Speed Science</i> event at the <i>Glasgow Science Festival</i>	June 2014
Demonstrator at the <i>Discovering the Higgs Boson</i> exhibit at the <i>Big Bang Fair</i> , Birmingham NEC	March 2014

Skills

- Data analysis techniques, including multivariate selection, maximum-likelihood fitting, amplitude analysis and limit-setting
- Proficiency with C, C++, Python and shell scripting
- Experience with ROOT (incl. TMVA, RooFit and RooStats), GSL, Boost and the LHCb software (incl. Gauss and DaVinci)
- Experience using parallel computing resources, such the Edinburgh and CERN batch services and the LHC Grid (via DIRAC and Ganga)
- Experience with collaborative software development and version control systems (Git and SVN)

Publications