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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 —
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 $B_s^0 \to \phi K^+ K^-$ decays 2015 —
An amplitude fit to $B_s^0 \to \phi K^+ K^-$ events with $m(K^+K^-) < 1.8$ GeV. The decay $B_s^0 \to \phi f_2'(1525)$ is observed for the first time, and measurements are made of its branching fraction and longitudinal polarisation fraction.

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 $B^0 \to \psi(2S)K^+\pi^-$ 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 $B_s^0 \to \phi\phi$ branching fraction and search for $B^0 \to \phi\phi$ 2014 — 2015
The $B_s^0 \to \phi\phi$ branching fraction was measured using $B^0 \to \phi K^{*0}$ for normalisation, resulting in a factor of five reduction in the statistical uncertainty compared to the previous best result. In addition, a search was performed for the suppressed $B^0 \to \phi\phi$ decay, and an upper limit placed on its branching fraction, which is a factor of seven improvement comapared 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 $B_s^0 \to \phi\phi$ decays 2013 — 2014
A time-dependent angular fit performed to $B_s^0 \to \phi\phi$ 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 to obtain event yields.

Hardware and operations

LHCb control room shifts (4$\times$ shift leader & 11$\times$ data manager)	2015 — 2016
RICH piquet shifts (3 weeks)	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: *Charmless b-meson and b-baryon decays at LHCb*

LHCC Poster Session CERN, March 2016
Poster: *Measurement of the $B_s \to \phi\phi$ branching fraction and angular analysis of $B_s \to \phi\pi^+\pi^-$ at LHCb*

UK HEP forum: "Anomalies and Deviations" workshop STFC, Abingdon, November 2015
Poster: *Measurement of the $B_s \to \phi\phi$ branching fraction and search for $B^0 \to \phi\phi$ at LHCb*

European School of High-Energy Physics Bansko, Bulgaria, September 2015

Young Experimentalists and Theorists Institute (YETI) workshop Durham University, January 2015

STFC HEP summer school University of Warwick, September 2014

B-physics at frontier machines (Beauty) conference University of Edinburgh, July 2014
Poster: *Measurement of CP violation in $B_s^0 \to \phi\phi$ decays*

Public outreach

Participant in an 'Ask Me Anything' session organised by CERN on *reddit.com*	May 2015
Participant in a *Speed Science* event at the *Glasgow Science Festival*	June 2014
Demonstrator at the *Discovering the Higgs Boson* exibit at the *Big Bang Fair*, Birmingham NEC	March 2014

Skills

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

Publications