Marko Stamenkovic
PhD in Experimental Physics

PERSONAL DETAILS

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EDUCATION

Ph.D in experimental high energhy physis 2017-2022
Nikhef and UvA, University of Amsterdam, Amsterdam, Netherlands
 Direct constraint on Higgs-charm coupling with ATLAS

M. Sc. and B.A. in Experimental Physics 2012-2017
EPFL, Ecole Polytechnique Fédérale de Lausanne, Switzerland
 Search for new physics in $c \to u$ transitions with LHCb

GRANTS, FELLOWSHIPS AND AWARDS

Postdoctoral fellowship at Brown University 2022-present
Brown University, CMS group, supervisor: Prof. Greg Landsberg

LPC 2025 distinguished researcher award 2025
FNAL, Fermilab, CMS group, 40'000 USD

LPC 2024 distinguished researcher award 2024
FNAL, Fermilab, CMS group, 40'000 USD

CMS poster award 2023
1st poster prize: Probing the Higgs potential through HHH production, CMS week at Saint-Malo

Swiss National Science Foundation PhD mobility grant 2021
LBNL, Lawrence Berkeley National Laboratory, ATLAS group, 26'000 CHF

PHYSICS ANALYSIS ACTIVITIES

Search for HHH with the CMS detector 2022-present
CMS group, Brown University, supervisor: Prof. Greg Landsberg
 First search for the non-resonant HHH process performed by the CMS collaboration. Initiated and lead the HHH working group of CMS targeting non-resonant HHH measurements. First attempt to constrain simultaneously the trilinear and quartic coupling of the Higgs boson. Publication for September 2025.

HH and HHH parking at HLT 2023-present
CMS Trigger studies group
 Developer and maintainer of the HH and HHH parking strategy of the CMS collaboration for Run 3 data taking. In total, 350 Hz (7% of the total CMS HLT budget) dedicated to HLT paths targeting

b-jets and hadronic τ-signatures to improve the sensitivty of the CMS experiment to the HH and HHH processes.

Search for Higgs boson coupling to charm quarks, PhD Thesis 2017-2022
ATLAS group, Nikhef, supervisor: Prof. Wouter Verkerke, Dr. Tristan du Pree, Dr. Hannah Arnold
Direct search for the standard model Higgs boson decaying to a pair of charm quarks using data collected by the ATLAS experiment at CERN between 2015 and 2018 at $\sqrt{s} = 13$ TeV. Role: main analyser of the 2-lepton channel and the combination of the 0-/1-/2-lepton channels, software implementation of the VH(cc) analysis, main designer of the analysis strategy to achieve orthogonality with H(bb), first kinematic fit in the Z(ll)H(cc) topology, background modelling, interpretation of the κ_c coupling modifier, combination with VH(bb), extrapolation to HL-LHC, main editor of the internal documentation (400 pages). This work enabled the inclusion of κ_c in the Higgs combination and the result was published in *Nature*.

Flavour tagging: exclusive D-mesons reconstruction 2021-2022
ATLAS group, LBNL, supervisor: Prof. Heather Gray, Dr. Miha Muskinja
Study on possible improvements in flavour tagging algorithms using exclusive D-meson reconstructions, focus on reconstruction of $D^+ \to K^- \pi^+ \pi^+$, $D^0 \to K^- \pi^+$ and $D^0 \to K^- \pi^+ \pi^- \pi^+$, inclusion of $D - K$ charge correlation in flavour tagging algorithms, new flavour tagging calibrations using $W + D$ analysis. Work on $H \to c\bar{c}$ towards combination of direct and indirect constraints on κ_b and κ_c.

Search for new physics in $c \to u$ transitions, Master Thesis 2017
LHCb group, LPHE, EPFL, supervisor: Prof. Tatsuya Nakada
Search for the rare decay $\Lambda_c^+ \to p\mu^+\mu^-$ using data collected by the LHCb experiment at CERN in 2016 at a center of mass energy of $\sqrt{s} = 13$ TeV. Complete analysis of the process, selection optimisation using machine learning algorithms, statistical analysis.

LIST OF SELECTED PUBLICATIONS

HHH whitepaper
V. Brigljevic et al, arXiv:2407.03015, July 2024
HHH whitepaper describing the physics case of measuring HHH at the LHC, one of the main authors.

Reconstruction of boosted and resolved multi-Higgs-boson final states with symmetry-preserving attention
P. Baldi et al, publication expected Winter 2024
Collaboration between UC Irvine, UC San Diego, Caltech, Fermilab, Brown and Belgrade to solve jet assignement problem in HHH pairing.

Development of the CMS detector for the CERN LHC Run 3
CMS collaboration, JINST 19 (2024) P05064
HH and HHH parking strategy, development and efficiency measurement in 2022 data.

Enriching the physics program of the CMS experiment via data scouting and data parking
CMS collaboration, arXiv:2403.16134
HH and HHH parking strategy, including efficiencies for $HH4b$ and $HH2b2tau$.

A detailed map of Higgs boson interactions by the ATLAS experiment ten years after the discovery
ATLAS collaboration, Nature 607, 52–59 (2022).
First constraint on the Higgs coupling to charm quarks from a combined measurement of the Higgs boson properties.

Measurement of the total and differential Higgs boson production cross-sections at $\sqrt{s} = 13$ TeV with the ATLAS detector by combining the $H \to ZZ^* \to 4l$ and $H \to \gamma\gamma$ decay channels
ATLAS collaboration, CERN-EP-2022-143.
> Combined measurement of the $H \to ZZ^*$, $H \to \gamma\gamma$, $H \to b\bar{b}$ and $H \to c\bar{c}$ processes to constrain the Higgs boson coupling to bottom and charm quarks.

Direct constraint on the Higgs-charm coupling from a search for Higgs boson decays to charm quarks with the ATLAS detector
ATLAS collaboration, Eur. Phys. J. C 82, 717 (2022).
> Main analyser of the 2-lepton channel and the combination of the 0-/1-/2-lepton channels.

Extrapolation of sensitivity to $H \to b\bar{b}$ and $H \to c\bar{c}$ at HL-LHC
ATLAS collaboration, ATL-PHYS-PUB-2021-039.
> Main analyser for the VH(cc) and VH(bb) combination and extrapolation to HL-LHC.

Measurements of WH and ZH production in the $H \to b\bar{b}$ decay channel in pp collisions at 13 TeV with the ATLAS detector.
ATLAS collaboration, Eur. Phys. J. C 81, 178 (2021).
> Main contributor to the flavour tagging strategy and calibrations, software expert for the Hbb/cc framework.

Monte Carlo to Monte Carlo scale factors for flavour tagging calibration.
ATLAS collaboration, ATL-PHYS-PUB-2020-009.
> Comparison with data scale factor uncertainties, implementation and validation of Monte Carlo to Monte Carlo scale factors in the ATLAS flavour tagging recommendations.

Optimisation of the smoothing of b-jet efficiency scale factors in ATLAS.
ATLAS collaboration, ATL-PHYS-PUB-2020-004.
> Student supervision, new implementation, validation and maintenance in the flavour tagging software. This procedure was studied and extended to variable radius track jets in the context of flavour tagging.

PHYSICS, DETECTOR WORK AND PERFORMANCE STUDIES

CMS HGCAL ECON testing   2024-present
Fermilab group
> Contriubtor to the HGCAL ECONT and ECOND production chips testing as part of the Fermilab HGCAL effort, including total ionizing dose tests performed at CERN in July 2024 and January 2025, testing of more than 20'000 chips at Fermilab.

CMS Hbb convener   2023-present
Higgs CMS group, L3 position
> Hbb convener for the CMS Higgs group starting from September 2023. Review and organisation of Run 2 and Run 3 Hbb and Hcc analysis in CMS, including HH4b, VHbb/cc, VVHbb, Hbb+photon, HHH. In total, reviewed, commented, improved and approved 9 analysis since September 2023.

ETH Medal reviewer   2025
Swiss Institute of Technology in Zurich, ETHZ
> Expert reviewer for ETH medal awarded to 8% best doctoral theses performed at ETHZ.

Nuclear Physics B - peer reviewer   2025
Elsevier
> Expert reviewer for the Nuclear Physics Section B, providing detailed critiques that helped elevate the journal's publication standards.

CMS Higgs Trigger contact   2022-2023

Higgs CMS group, L3 position
> Convener of the Higgs trigger studies for the CMS collaboration. Responsible for 150 trigger filters used during data taking to ensure that the best data is collected for analyses targeting the Higgs boson. Major contribution: implementation and validation of the HH parking strategy for 2023, which will allow to record 60% more $HH \to b\bar{b}b\bar{b}$ events with respect to 2015-2018.

CMS HCAL Prompt Feedback Group convener 2023
HCAL CMS group, L3 position
> Convener of the Prompt Feedback Group for the HCAL subdetector of the CMS experiment. Weekly feedback on the quality of the data recorded by the HCAL subdetector.

CMS HCAL operations 2022-present
HCAL CMS group
> Main responsible of the logical map related the back-end and front-end electronics. Support for HCAL operations and interventions during data taking to ensure that quality data is taken by the CMS detector. Main contributor to the uHTR resynchronisation functionality, which will allow to save 1-2 fb^{-1} of data per year.

ATLAS Calibration Data Interface contact 2018-2022
Flavour tagging group
> Main responsible of the flavour tagging distribution (including the tagger definitions and calibrations) centrally provided to the ATLAS collaboration. Implemented validation procedure of the calibrations and improve post-processing procedures as well as novel submission interface for calibrations.

INVITED TALKS

CMS HH and HHH parking at HLT 2024
ATLAS and CMS flavour tagging workshop, Genoa

Direct constraint on the Higgs-charm coupling 2021
Invited seminar at the University of Zurich

CONFERENCES

Organiser of the second HHH workshop 2025
HHH workshop, DubrovnikLink

Organiser of the CMS Higgs charm workshop 2024
Higgs charm workshop, MIT Link

Organiser of the first HHH workshop 2023
HHH workshop, DubrovnikLink

CMS searches for Higgs boson decays to charm quark anti-quarks pairs 2022
Higgs 2022 conference - Link

Higgs coupling to second generation fermions with ATLAS 2021
EPS-HEP 2021 conference, Higgs session - Link

Charm is better than beauty: search for $H \to c\bar{c}$ 2021
LHCP 2021 conference, poster session - Link

Search for $H \to c\bar{c}$ 2021

Physics@Veldhoven, Dutch National Physics conference

SELECTED PRESENTATIONS

CMS HCAL: towards Run 2023   2023
CMS week, Saint-Malo

Paper approval presentation: $H \to c\bar{c}$ 2021
ATLAS weekly meeting, CERN

Conference approval meeting: $H \to c\bar{c}$ 2021
ATLAS meeting, CERN

Flavour tagging in ATLAS   2020
ATLAS week, CERN

Flavour tagging software: tools for physics validation   2019
ATLAS flavour tagging workshop, Hamburg

Flavour tagging: calibration machinery   2019
ATLAS flavour tagging workshop, Hamburg

VH(cc) analysis: plans towards full Run 2   2019
ATLAS H(bb) workshop, Genoa

Overview of charm tagging algorithms in ATLAS   2018
ATLAS Physics & Performance week, CERN

STUDENTS SUPERVISION

Machine learning at CMS: anomaly detection, tau reconstruction   2024
Jason Huang, Hayden Miller, Rohan Pankaj, Jordan Pfeifer and Gavin Pitt, Brown University
 Brown summer student program at CERN together with Greg Landsberg and Loukas Gouskos. Daily supervision of undegrad students during the summer at CERN.

Symmetry preserving attention networks for jet assignement in HHH   2023
Jovan Mitic, University of Belgrade
 Supervision during master thesis, usage of advanced machine learning tools to improve pairing efficiency of Higgs bosons for HH and HHH processes.

Charm fragmentation studies: $W + D^0$, $D^0 \to K^- \pi^+ \pi^- \pi^+$ 2021
Riley Clark, University of California Berkeley
 Supervision during undergraduate research program (URAP), test of charm fragmentation function in ATLAS, aim at testing the results observed by ALICE in pp-collisions.

Exclusive D-meson reconstructions to improve charm tagging   2020-2021
Zhuoran Feng, University of Amsterdam
 Supervision during the master thesis in the Nikhef ATLAS group, successfully improved the sensitivity of the $H \to c\bar{c}$ analysis by 5% with new exclusive reconstructions methods. Zhuoran was successfully hired for a PhD position at Nikhef during her master project.

Implementation of a neural network in the $H \to c\bar{c}$ **analysis**   2020

Cecile van der Stappen, University of Amsterdam
> Supervision during the bachelor thesis in the Nikhef ATLAS group, achieved a +50% improvement in the sensitivity of the 2-lepton $H \to c\bar{c}$ channel

Optimisation of the smoothing of b-jet identification efficiency 2018-2019
Hayden Smith, Oxford University
> Supervision during the qualification task in the ATLAS flavour tagging group, resulted in a publication

TEACHING ACTIVITIES

Introduction to programming (Python): x2 2019
University of Amsterdam, Dr. Ivo van Vulpen and M.S. Martijn Stegeman
> Bachelor level lecture with 20 sessions per course

Introduction to (astro-)particle physics 2018
University of Amsterdam, Prof. Patrick Decowski and Dr. Ivo van Vulpen
> Bachelor level lecture with 20 sessions per course

Classical mechanics and Introduction to C++ programming 2013-2017
EPFL, Ecole Polytechnique Fédérale de Lausanne
> Bachelor level lecture with 14 sessions per semester for 6 semesters

MEDIA COVERAGE

La Gruyère - Dans les coulisses du CERN 2018
Bulle, Switzerland
> Article (french) in local Swiss press about CERN and my research- Link

La Liberté - Un Veveysan à la conquête du boson 2018
Fribourg, Switzerland
> Article (french) in local Swiss press about my academic studies and research - Link

SCIENCE COMMUNICATION AND OUTREACH

Search for charming decays of the Higgs 2021
Online, social media
> ATLAS outreach video explaining $H \to c\bar{c}$ result - Link

Nikhef paperclip - Finding Higgs to cc 2021
Online, social media
> Nikhef outreach video explaining $H \to c\bar{c}$ result - Link

Nikhef blog - Last proton-proton collisions of Run 2 2018
Amsterdam, Netherlands
> Article about last Run 2 proton-proton collisions with the ATLAS detector - Link

CERN guide and open days 2016-2021
Swtizerland and Netherlands
> Guide at various open days events at EPFL and Nikhef as well as CERN guide