



Universität
Münster

LIGHT MESON DECAYS AT BESIII

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On behalf of the BESIII Collaboration

Mainz, 17th October 2023

living.knowledge

NRW-FAIR
Netzwerk

ME
NU

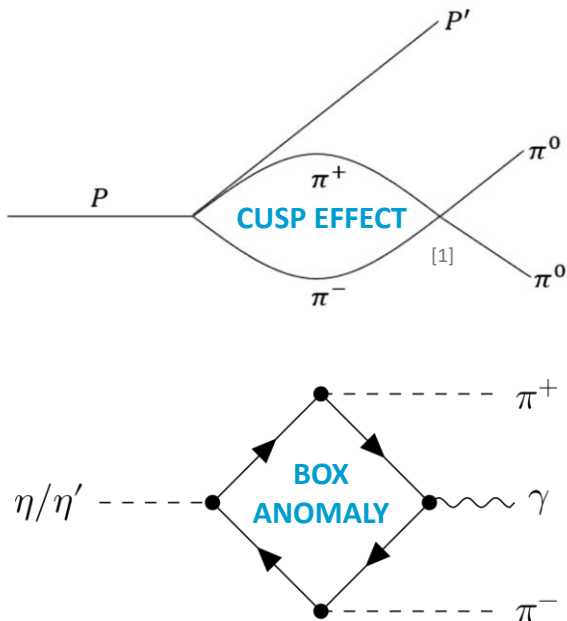


2023

WHY YOU SHOULD BE INTERESTED IN LIGHT MESON DECAYS

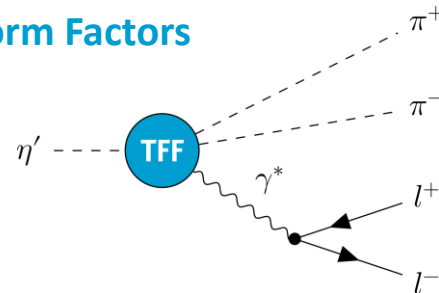
EXPLORE THE NON-PERTURBATIVE REGIME OF QCD & REACH THE LIMITS OF THE STANDARD MODEL

Test Effective Field Theory Predictions



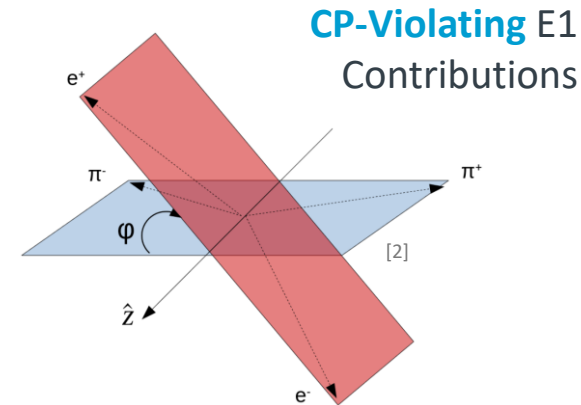
Investigate the Meson Substructure

Probe **Transition Form Factors**

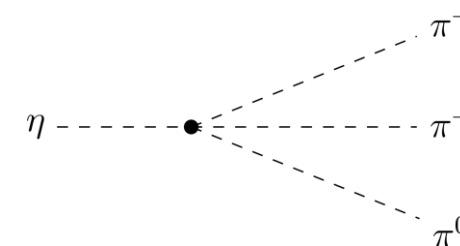


Hadronic Light-by-Light Contributions to the **Muon Anomalous Magnetic Moment**

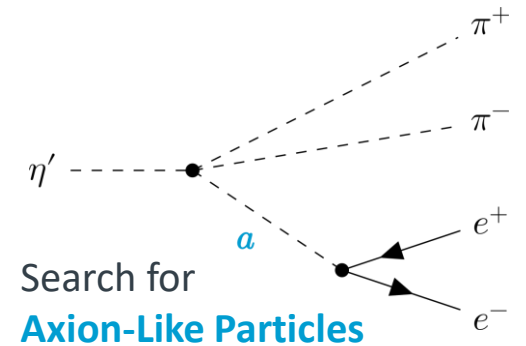
Search for Symmetry Violations



Rare **Isospin Violating** Decays



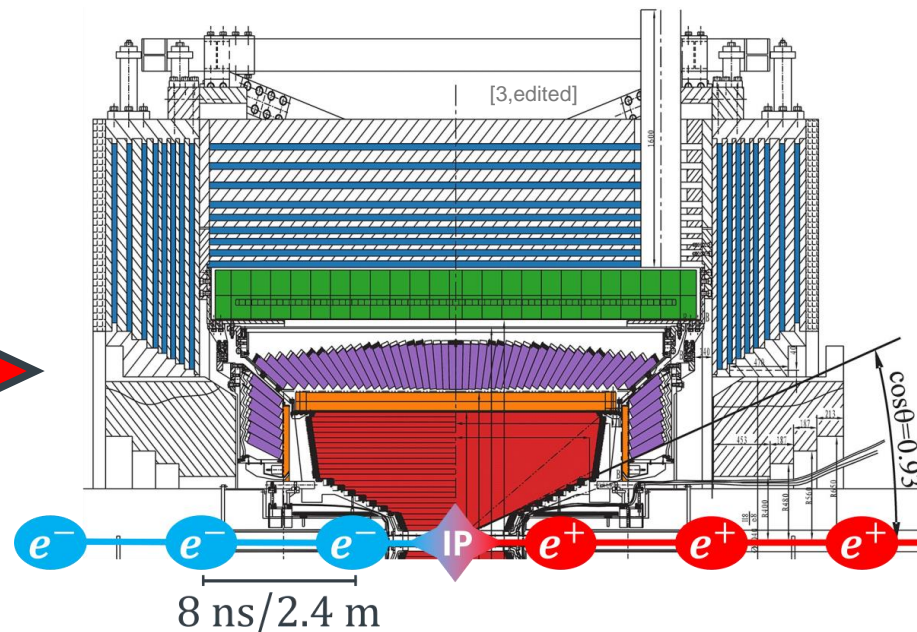
Discover New Particles & Rare Decays



Search for **Axion-Like Particles**

AND MUCH MORE!

90 Institutions



Over 600 Members

Worlds Largest J/ψ Data Set with 10^{10} Events!

$J/\psi \rightarrow \gamma\eta^{(\prime)}$		$J/\psi \rightarrow \phi\eta^{(\prime)}$	
$1 \times 10^7 \eta$	$5.2 \times 10^7 \eta'$	$4 \times 10^6 \eta$	$2.5 \times 10^6 \eta'$

➔ LIGHT MESON FACTORY

Over 1 decade of
successful **LIGHT MESON**
DECAY research with BESIII

> **First Observations**

> **Precision Measurements**

> **Upper limits**

See you at the
poster session!

Decay Channel	Physics	Publication
$\eta' \rightarrow \pi^+\pi^-\pi^+\pi^- / \pi^+\pi^-\pi^0\pi^0$	First Observation - BR	PRL112, 251801 (2014)
$\eta' \rightarrow \gamma e^+e^-$	First Observation - BR - TFF	PRD92, 012001 (2015)
$\eta \rightarrow \pi^+\pi^-\pi^0$ & $\eta/\eta' \rightarrow \pi^0\pi^0\pi^0$	Matrix Elements	PRD92, 012014 (2015)
$\eta' \rightarrow \omega e^+e^-$	First Observation - BR	PRD92, 051101 (2015)
$\eta' \rightarrow K\pi$	UL	PRD93, 072008 (2016)
$\eta' \rightarrow \rho\pi$	First Observation - BR	PRL118, 012001 (2017)
$\eta' \rightarrow \gamma\gamma\pi^0$	BR	PRD96, 012005 (2017)
$\eta' \rightarrow \gamma\pi^+\pi^-$	BR - Box Anomaly	PRL120, 242003 (2018)
$\eta' \rightarrow \pi^+\pi^-\eta / \pi^0\pi^0\eta$	Matrix Elements - Cusp Effect	PRD97, 012003 (2018)
$P \rightarrow \gamma\gamma$	BRs	PRD97, 072014 (2018)
$\omega \rightarrow \pi^+\pi^-\pi^0$	Dalitz Plot Analysis	PRD98, 112007 (2018)
Absolut BR of η' decays	BRs	PRL122, 142002 (2019)
$\eta' \rightarrow \gamma\gamma\eta$	UL	PRD100, 052015 (2019)
$\eta' \rightarrow \pi^0\pi^0\pi^0\pi^0$	UL	PRD101, 032001 (2020)
$\eta' \rightarrow \pi^+\pi^-\mu^+\mu^-$	First Observation - BR	PRD103, 072006 (2021)
Absolute BR of η decays	BRs	PRD104, 092004 (2021)

MORE EXCITING NEW BESIII RESULTS ON THE POSTER!