

Marzia Bordone

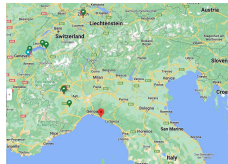


TH Retreat

09.11.2022

Personal Introduction

Nationality: Italian



Hobbies:

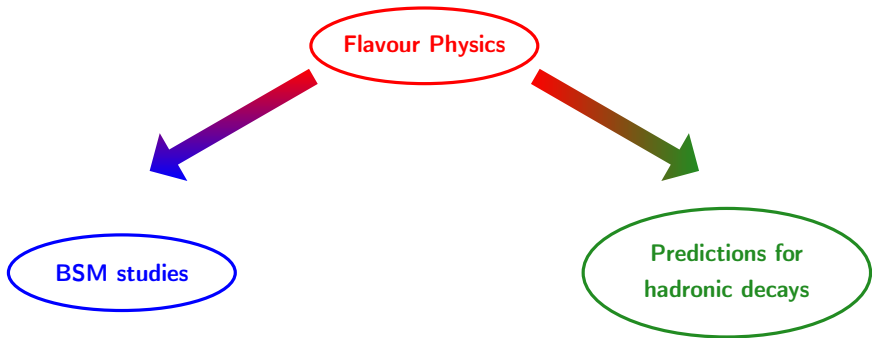
- Cooking
- Limoncello making
- Volleyball



Physics Introduction

- 2008-2014: Undergraduate Studies at University of Genoa
 - ⇒ Supervisor: Carla Biggio, strong collaboration with Giovanni Ridolfi e Luca di Luzio
- 2014-2018: Ph.D. at University of Zürich
 - ⇒ Supervisor: Gino Isidori, strong collaboration with Danny van Dyk
- 2018-2020: Post-doctoral position at University of Siegen
 - ⇒ Co-workers: Thorsten Feldmann, Alex Khodjamirian, Thomas Mannel
- 2020-2021: Post-doctoral position at University of Turin
 - ⇒ Co-workers: Paolo Gambino, Martin Jung (already collaborators)
- Since January 2022 I joined CERN-TH!
 - ⇒ Soon-to-be co-workers: Matteo Fael and Peter Stangl + daily consultations with LHCb members

Research Lines

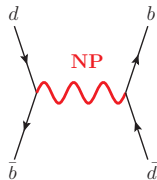


BSM studies

- Bottom-up approaches to explain the flavour puzzle and flavour data
- EFT analysis of current data and viability of different scenarios with and without flavour symmetry
 - ⇒ Froggatt-Nielsen mechanism for lepton masses and NP couplings
 - ⇒ Flavour symmetry like $U(2)^5$
- Link to simplified models

$$Y_q \sim \begin{pmatrix} \cdot & \cdot & \cdot \\ & \cdot & \cdot \\ & & \bullet \end{pmatrix}$$

$$g_{\text{NP}}^{ij} \sim \mathcal{O}(?)$$



Predictions for hadronic decays

- $\langle H_{(c,s,u)} | \mathcal{O}_i | H_b \rangle = ?$
 - Hadronic dynamics happens at scales $\mu \sim \Lambda_{\text{QCD}}$
 - ⇒ Effective Theories of QCD can be used (e.g. HQET)
 - ⇒ Non perturbative methods as QCD Sum Rules are useful
 - ⇒ Model independent parametrisation based on analyticity
 - ⇒ Personal area of expertise: $B \rightarrow D^{(*)}$, $\Lambda_b \rightarrow \Lambda_c^{(*)}$, $\Lambda_b \rightarrow \Lambda^*$, $B_c \rightarrow J/\psi$
- $\langle D^{(*)+} K | \mathcal{O}_i | B \rangle = ?$
 - Factorisation of long- and short-distance terms through QCD Factorisation that exploits an expansion in $\Lambda_{\text{QCD}}/m_{b,c}$
 - Critical point: evaluation of next-to-leading power corrections
- $\langle K \ell^+ \ell^- \gamma | \mathcal{O}_i | B \rangle = ?$
 - Scalar QED approximation
 - Comparison with MC method PHOTOS
 - Ongoing work on $B \rightarrow D^{(*)} \ell \bar{\nu}$ decays

The results are used for thorough comparison with experimental data to assess whether there is new physics or not and extract fundamental SM parameters like V_{cb}

New initiative: Flavour coffee!!

- When? Monday, 10 am in 4/2-037
- Informal meeting between Lattice flavour people and BSM + SM members
- Discussion of common topics and details that are usually not addressed in talks

Everyone is very welcome to join!

