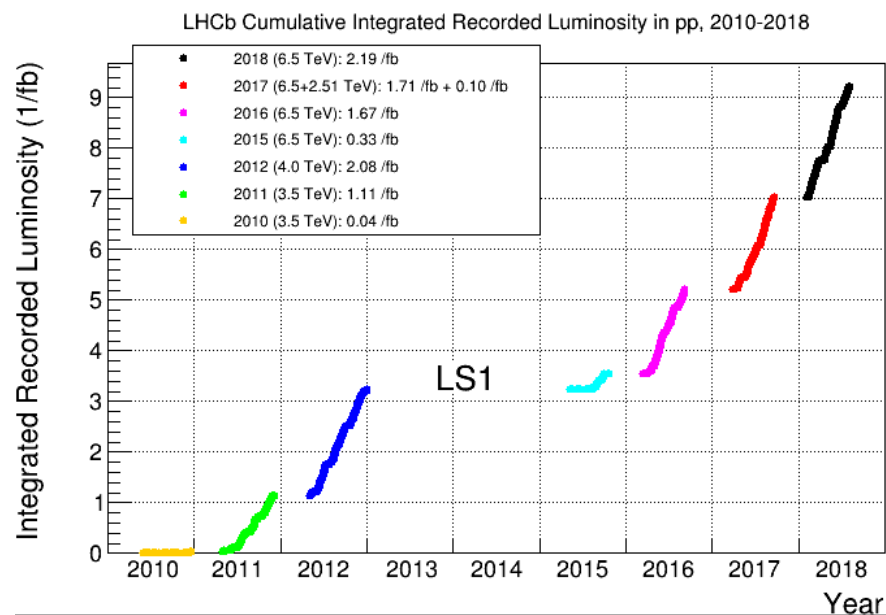




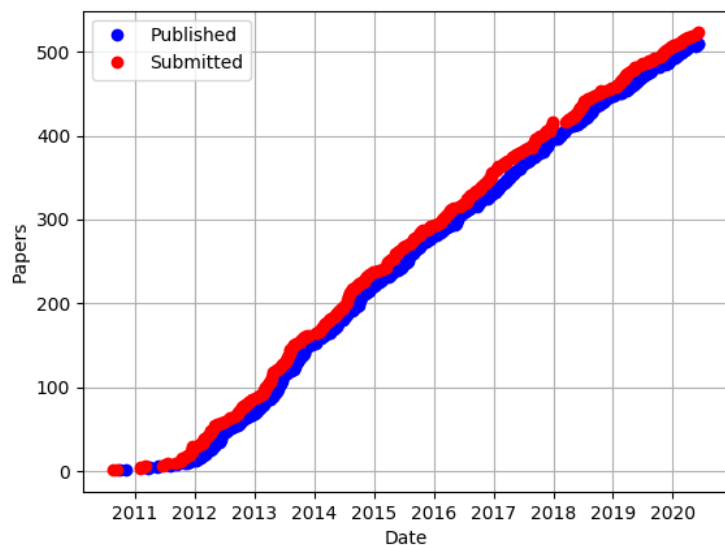
Attività e anagrafica LHCb



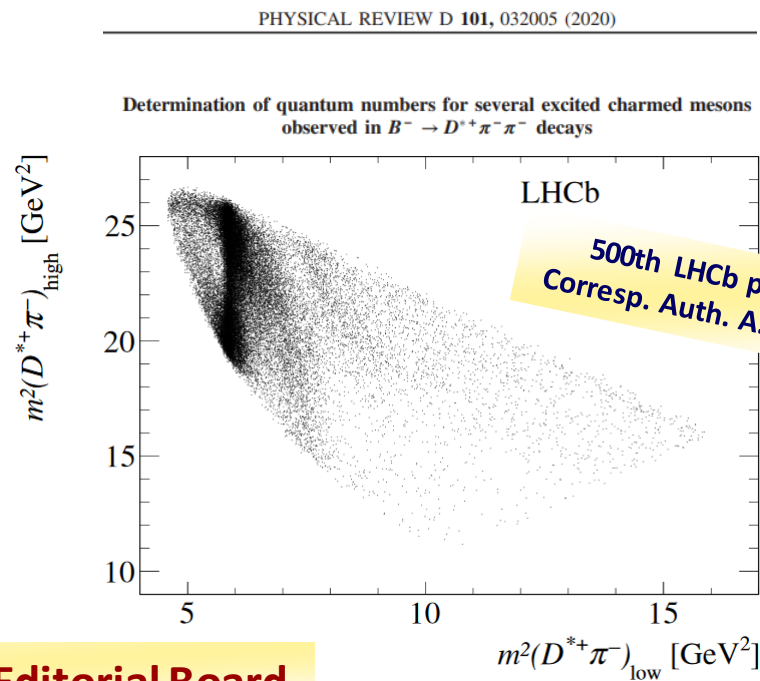
plus several datasets of proton-lead, lead-lead collisions
as well as fixed target datasets: pNe, pHe, pAr, PbAr

LHCb detector currently undergoing major upgrade:

- All sub-detectors updated, many sub-detectors overhauled or replaced
- Completely new trigger strategy (purely software)



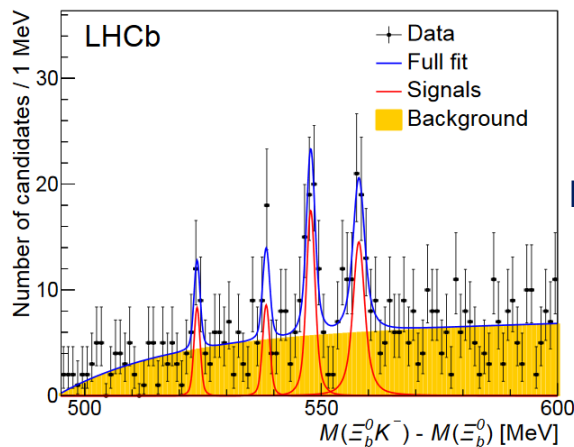
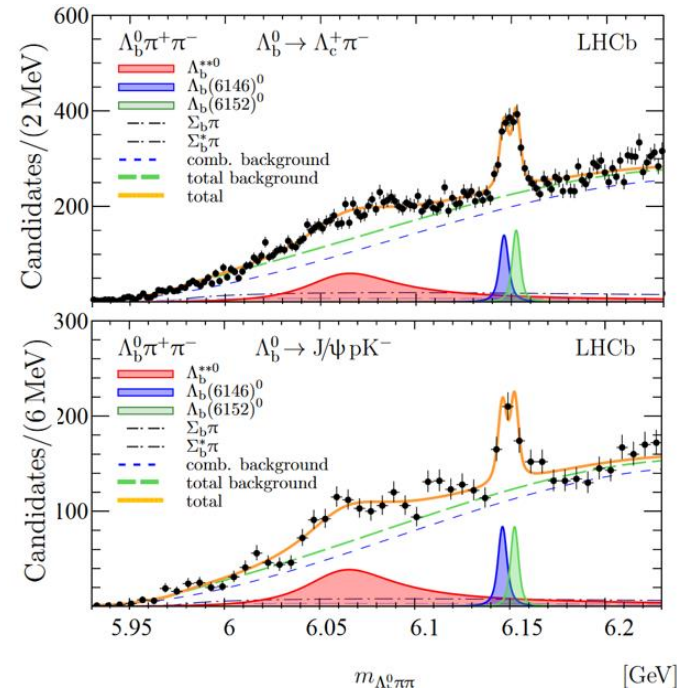
More than 500 published papers!



A. Palano recently nominated Member of the Editorial Board



Observation of a new beauty baryon particle



First observation of excited Ω_b^- states

LHCb $B^+ \rightarrow \chi_{c1}(3872)K^+$

LHCb $b \rightarrow \chi_{c1}(3872)X$

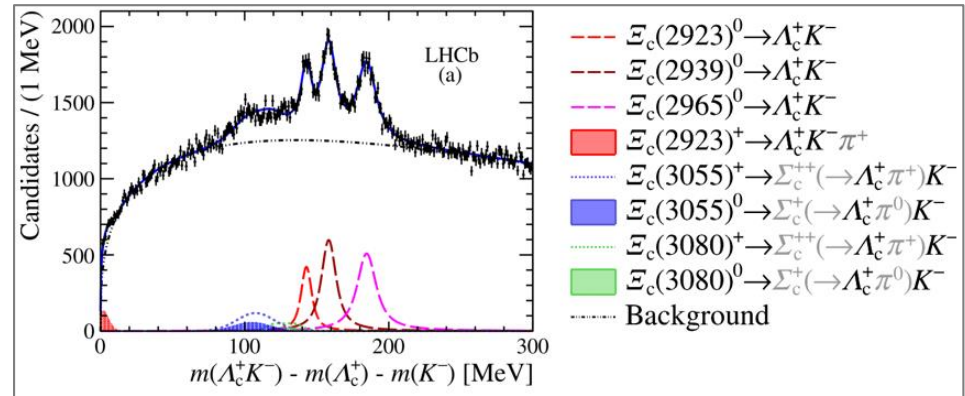
Belle $B \rightarrow \chi_{c1}(3872)K$

BES III $e^+e^- \rightarrow \chi_{c1}(3872)\gamma$

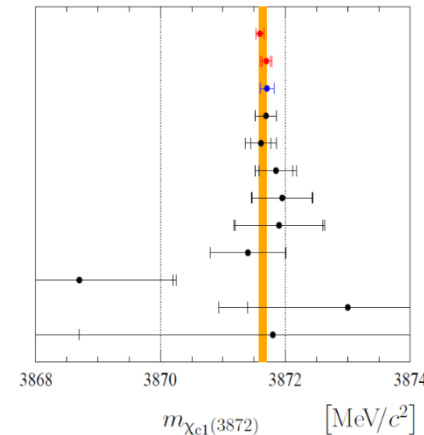
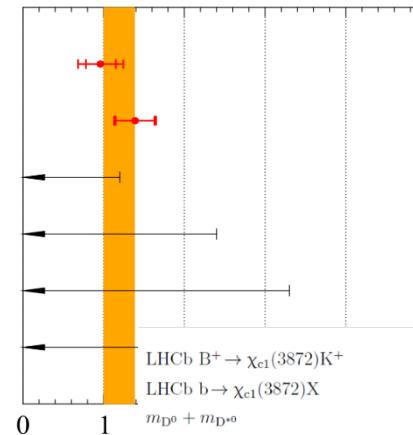
BaBar $B \rightarrow \chi_{c1}(3872)K$

BaBar $B \rightarrow \chi_{c1}(3872)K$

Observation of new Ξ_c^0 baryons



Study of the $\chi_{c1}(3872)$ state

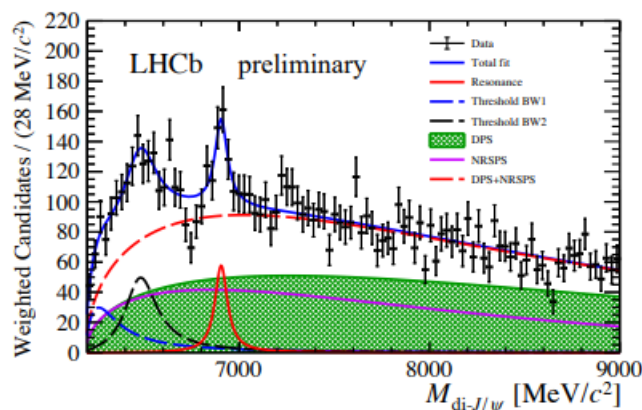


CdS 13-14 luglio 2020



Latest results on exotic hadrons (seminar at CERN on June 16th, 2020)

J/ψ -pair mass spectrum (I)



[LHCb-PAPER-2020-011]
in preparation

Observation of structures in the J/ψ pair mass spectrum

➤ J/ψ mass and pointing-to-PV constraints applied

➤ J/ψ -pair invariant mass spectrum shows

- ✓ A broad structure next to threshold ranging from 6.2 to 6.8 GeV/c^2
- ✓ A narrower structure at about 6.9 GeV/c^2
- ✓ Hint for another structure around 7.2 GeV/c^2
- ✓ No evidence for further structures above 7.2 GeV/c^2

➤ The J/ψ -pair invariant mass spectrum is inconsistent with non-resonant SPS and DPS only hypothesis by more than 5σ in the $[6.2, 7.4] \text{ GeV}/c^2$ mass region

➤ A narrow peaking structure matching the lineshape of a resonance and a broader structure close to the threshold are found

➤ The structures are consistent with predicted $T_{cc\bar{c}\bar{c}}$ states

➤ Assuming the 6.9 GeV/c^2 structure is a resonance with Breit-Wigner lineshape

✓ Based on no-interference fit

$$M = 6905 \pm 11(\text{stat}) \pm 7(\text{syst}) \text{ MeV}/c^2$$

$$\Gamma = 80 \pm 19(\text{stat}) \pm 33(\text{syst}) \text{ MeV}/c^2$$

✓ Based on the simple model with interference

$$M = 6886 \pm 11(\text{stat}) \pm 11(\text{syst}) \text{ MeV}/c^2$$

$$\Gamma = 168 \pm 33(\text{stat}) \pm 69(\text{syst}) \text{ MeV}/c^2$$

Preliminary!



Il gruppo LHCb-Bari è coinvolto nelle seguenti attività:

- **Sviluppo del sistema di acquisizione dati del rivelatore di muoni per l'upgrade di fase 1**
- **Proposta di un rivelatore di muoni per la fase 2**
- **Studi di spettroscopia di mesoni charmati**

Partial wave analysis of $B \rightarrow K_s^0 K K \pi$

A. Palano, M. Martinelli (Milano Bicocca)

Dalitz plot analysis of $B^0/B_s^0 \rightarrow D^*(2010) K_s^0 \pi$

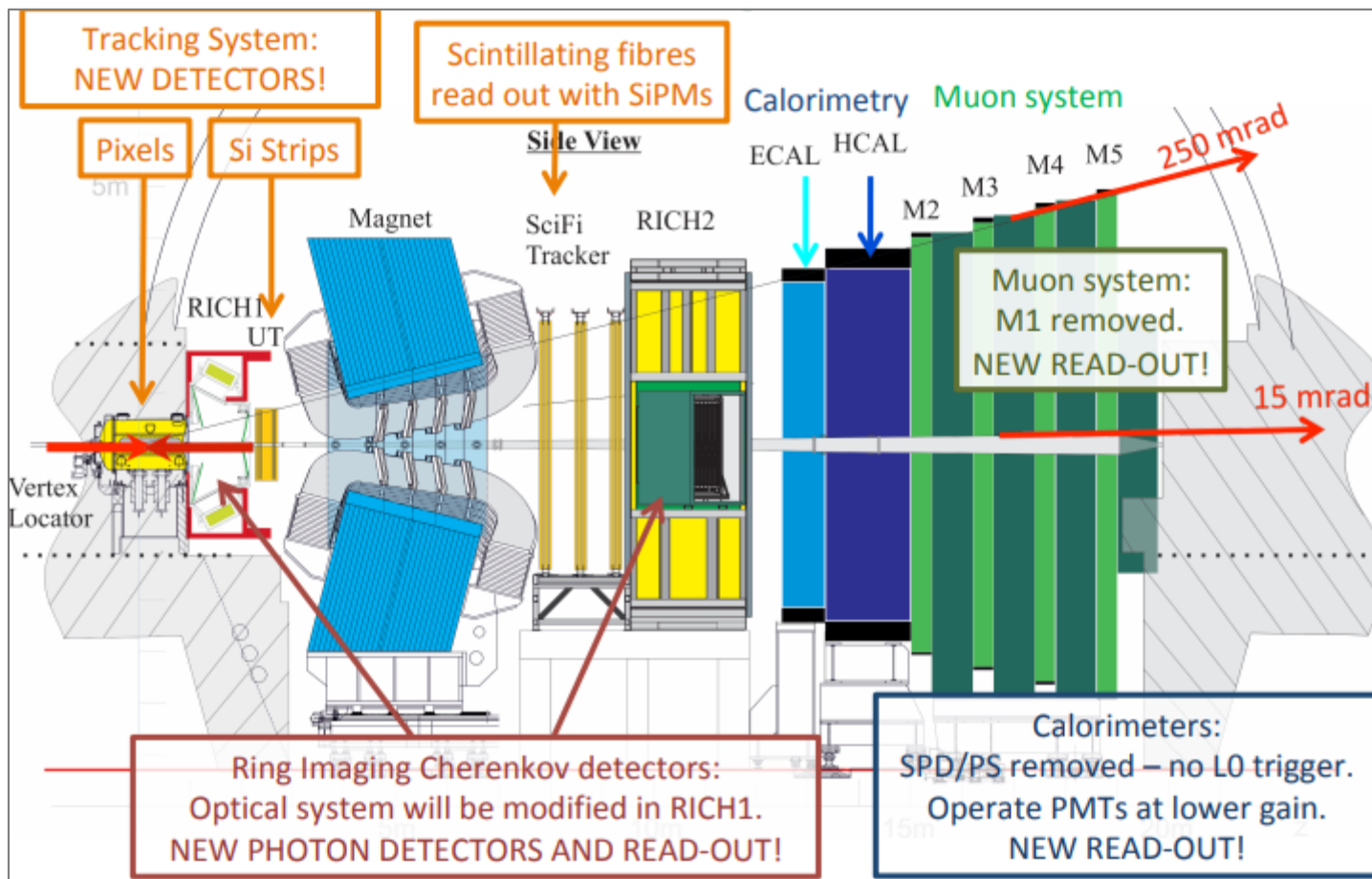
M. De Serio, M. Martinelli, A. Palano, A. Pastore

- **Ricerca di segnali di violazione dell'universalità leptonica**

Measurement of the $B_s \rightarrow D_s \tau \nu_\tau$ branching fraction using 3 prong τ decays

R.A. Fini (in collaborazione con INFN Ferrara et al.)

LHCb upgrade phase I





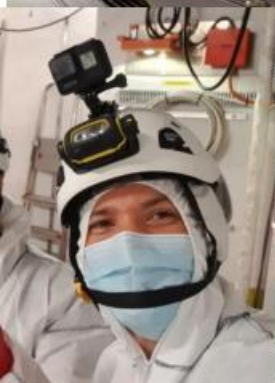
First activities at the LHCb experimental site and in CERN labs re-started in early May 2020 after the stop due to Covid-19, **almost all projects re-started now**



HCAL Beam Plug installation



Muon electronics installation

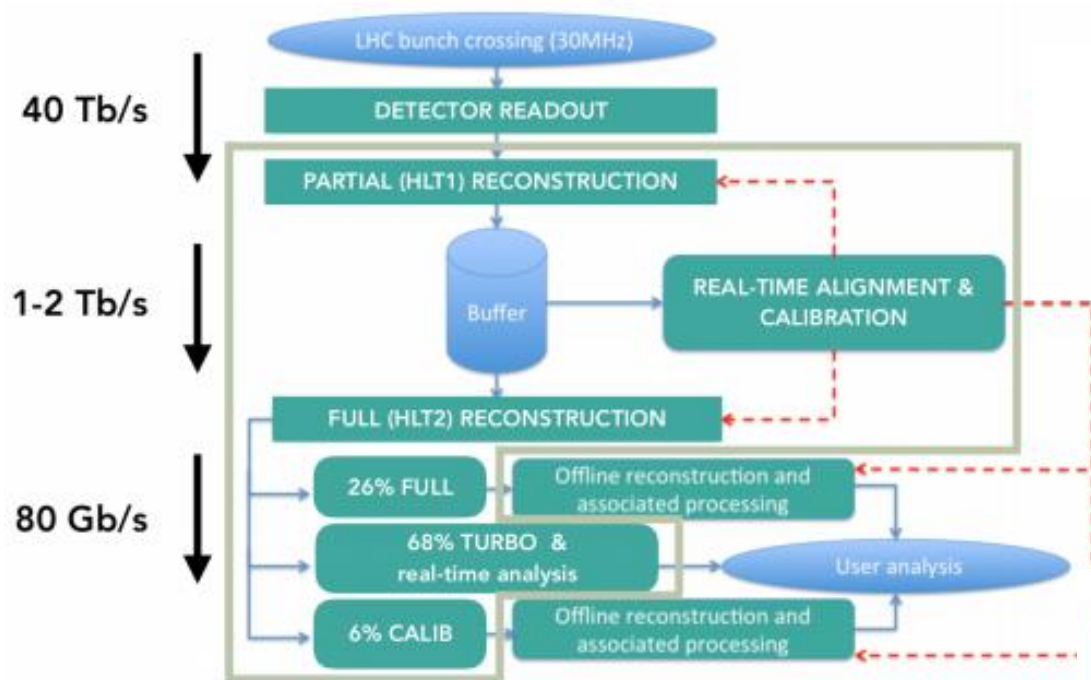


RF foil installation



Installation of EB servers



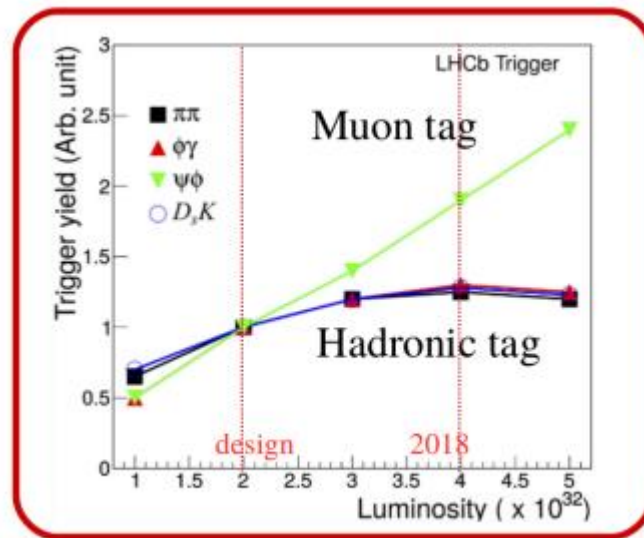


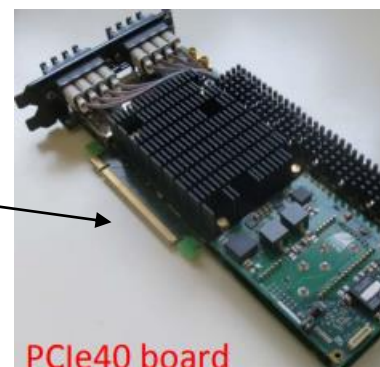
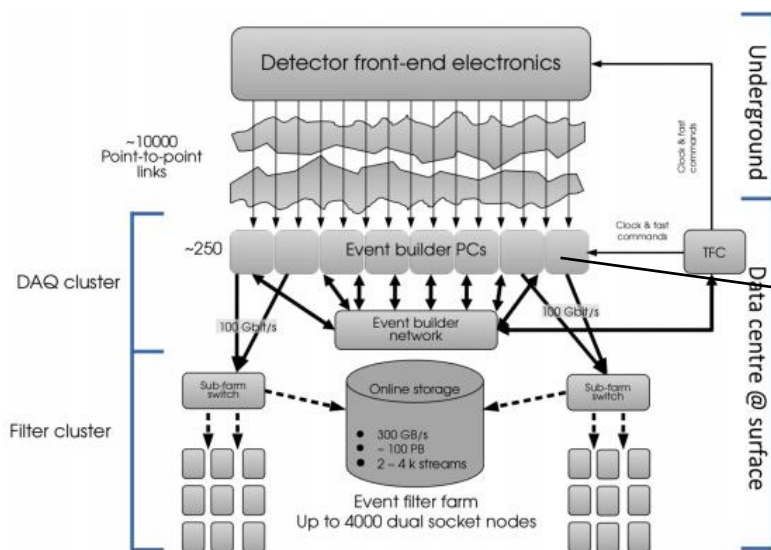
Remove the hardware trigger, detector readout at 30 MHz

Perform partial reconstruction and selection to reduce data flow from 40 Tb/s to 1-2 Tb/s: HLT1

Align and calibrate the detector in real time

Perform full reconstruction with offline quality in real time: HLT2





**Muon detector specific firmware of the new readout board (TELL40)
developed by Bari and Roma2 groups**

Commissioning delayed

LHCb Upgrade Muon TELL40 Data Processing

Technical Note

Issue:	Draft
Revision:	1.1
Reference:	EDMSXXXXXXXX
Created:	June 5, 2018
Last modified:	April 14, 2020
Prepared by:	M. De Serio ^a , E. Santovetti ^b , A. Satta ^b
	^a INFN Bari
	^b INFN Roma Tor Vergata



- **LHCC September 2018**

"The LHCC recommends the LHCb collaboration for successfully preparing the physics case report for running beyond LS4 and supports the activities of the LHCb collaboration in planning for HL-LHC running through the preparation of TDRs"

- **Briefing book for the 2020 European Strategy**

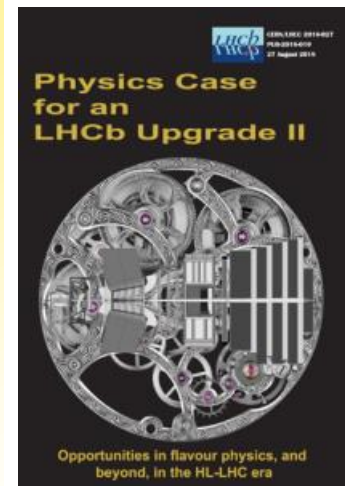
Particle Physics (<http://cds.cern.ch/record/2691414>)

Many supportive comments including:

"The LHCb Upgrade II... will enable a wide range of flavor observables to be determined at HL-LHC with unprecedented precision"

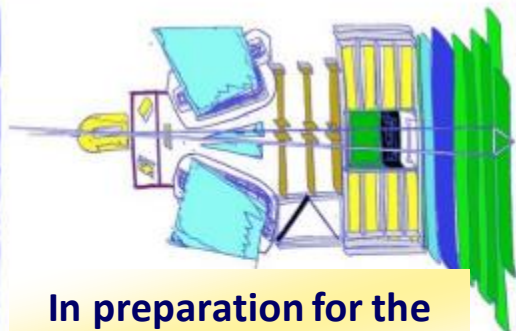
- **CERN Research Board September 2019**

"The recommendation to prepare a framework TDR for the LHCb Upgrade-II was endorsed, noting that LHCb is expected to run throughout the HL-LHC era. "



5th WORKSHOP ON LHCb UPGRADE II

30.03.2020 - 01.04.2020
Barcelona



In preparation for the
Framework TDRs

Towards a Muon Phase II Detector

Bari group involved in the discussions
for the future Muon Detector

Considerations on Muon detector upgrade II

RPC For R4 Regions

M. De Serio, S. Simone

Albicocco¹, W. Baldini², G. Bencivenni¹, B. Boch³, N. Bondar³, D. Brundu⁴,
Deddu⁴, A. Cardini⁴, M. Carletti¹, L. Casu⁴, A. Chubykin⁵, P. Ciambrone¹,
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G. Martellotti⁷, G. Morello¹, M. Palutan¹, G. Passaleva^{8,12}, A. Pastore^{5,6}, M. Poli Lener¹,
D. Pinci⁷, R. Santacesaria⁷, M. Santimaria¹, A. Saputi^{1,8}, E. Santovetti^{1,3}, A. Sarti^{7,9},
C. Satriano^{7,10}, A. Satta¹³, B. Schmidt⁸, T. Schneider⁸, B. Sciascia¹, S. Simone^{5,6},
A. Vorobyev³

Anagrafica e richieste LHCb 2021

Ricercatori

M. De Serio
R.A. Fini
<i>A. Palano</i>
M. Pappagallo
A. Pastore
S. Simone
L. Congedo (PhD)

Richiesta servizi (LHCb + SHiP):

3 m.p. Servizio elettronico

3 m.p. Servizio meccanico

Backup slides

