

Attivita' in LHCb a Bari.

Antimo Palano

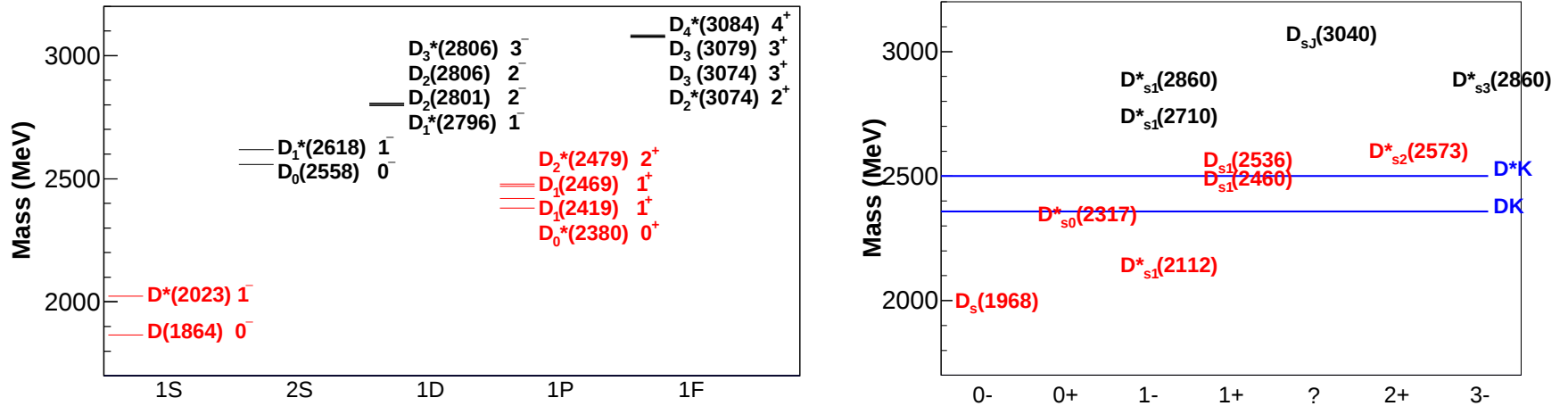
INFN and University of Bari

Manpower: A. Palano, (80% LHCb, 20% BaBar).

Bari, 30 giugno 2015

Charm meson spectroscopy

- The quark model predicts many states in limited mass regions.



- New progress in the understanding of the charm spectrum come from:

- Inclusive studies of $D^0\pi^+$, $D^+\pi^-$ and $D^{*+}\pi^-$;

$$pp \rightarrow D_J X$$

- Inclusive studies of D^0K^+ , $D^+K_S^0$ and $D^{*+}K_S^0$;

$$pp \rightarrow D_{sJ} X$$

- Exclusive studies in Dalitz plot analyses of B and B_s decays.

Spettroscopia del charm.

□ Pubblicati finora 2 articoli (con D. Milanes, ora a Bogota, Colombia).

Study of D_{sJ} decays to $D^+ K_S^0$ and $D^0 K^+$ final states in pp collisions

LHCb Collaboration (R Aaij (NIKHEF, Amsterdam) *et al.*). Jul 2012. 12 pp.

Published in **JHEP 1210 (2012) 151**

CERN-PH-EP-2012-181, LHCb-PAPER-2012-016

DOI: [10.1007/JHEP10\(2012\)151](https://doi.org/10.1007/JHEP10(2012)151)

e-Print: [arXiv:1207.6016](https://arxiv.org/abs/1207.6016) [hep-ex] | [PDF](#)

[References](#) | [BibTeX](#) | [LaTeX\(US\)](#) | [LaTeX\(EU\)](#) | [Harvmac](#) | [EndNote](#)

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[Detailed record](#) - [Cited by 25 records](#)

Study of D_J meson decays to $D^+ \pi^-$, $D^0 \pi^+$ and $D^{*+} \pi^-$ final states in pp collision

LHCb Collaboration (R Aaij (NIKHEF, Amsterdam) *et al.*). Jul 17, 2013. 26 pp.

Published in **JHEP 1309 (2013) 145**

CERN-PH-EP-2013-122, LHCb-PAPER-2013-026

DOI: [10.1007/JHEP09\(2013\)145](https://doi.org/10.1007/JHEP09(2013)145)

e-Print: [arXiv:1307.4556](https://arxiv.org/abs/1307.4556) | [PDF](#)

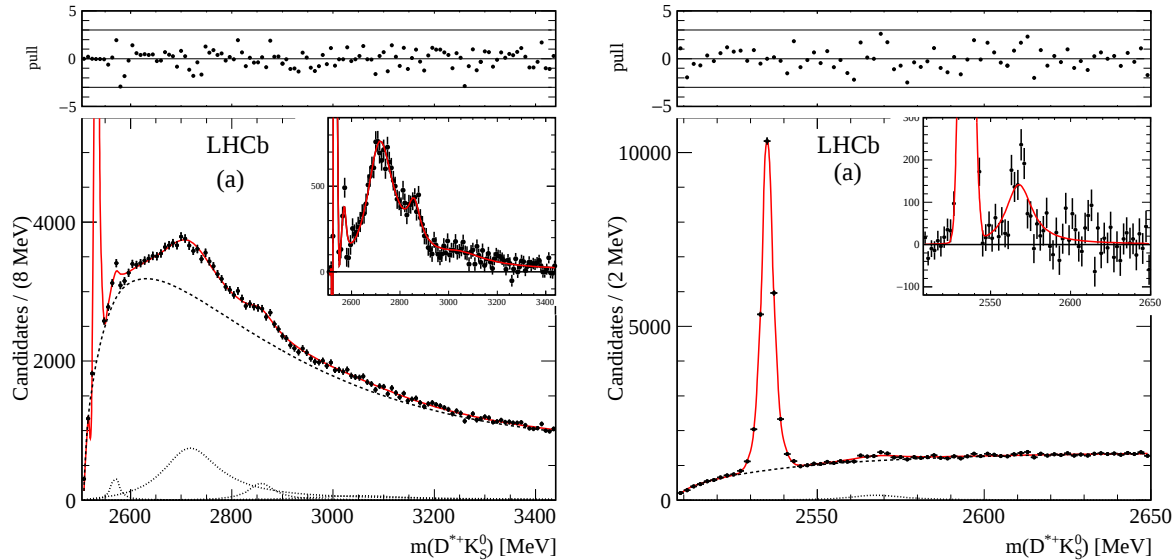
[References](#) | [BibTeX](#) | [LaTeX\(US\)](#) | [LaTeX\(EU\)](#) | [Harvmac](#) | [EndNote](#)

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[Detailed record](#) - [Cited by 32 records](#)

Analisi in corso: spettroscopia dei mesoni D_s .

- Studio inclusivo $D^{*+} K_S^0$ e $D^{*0} K^+$, $D^{*+} \rightarrow D^0 \pi^+$ e $D^{*0} \rightarrow D^0 \pi^0$.
- Scritto il primo draft dell'articolo.
- Osservazione degli stati $D_{s1}^*(2710)^+$ e $D_{s3}^*(2860)^+$.
- Prima osservazione del decadimento $D_{s2}^*(2573)^+ \rightarrow D^{*+} K_S^0$.



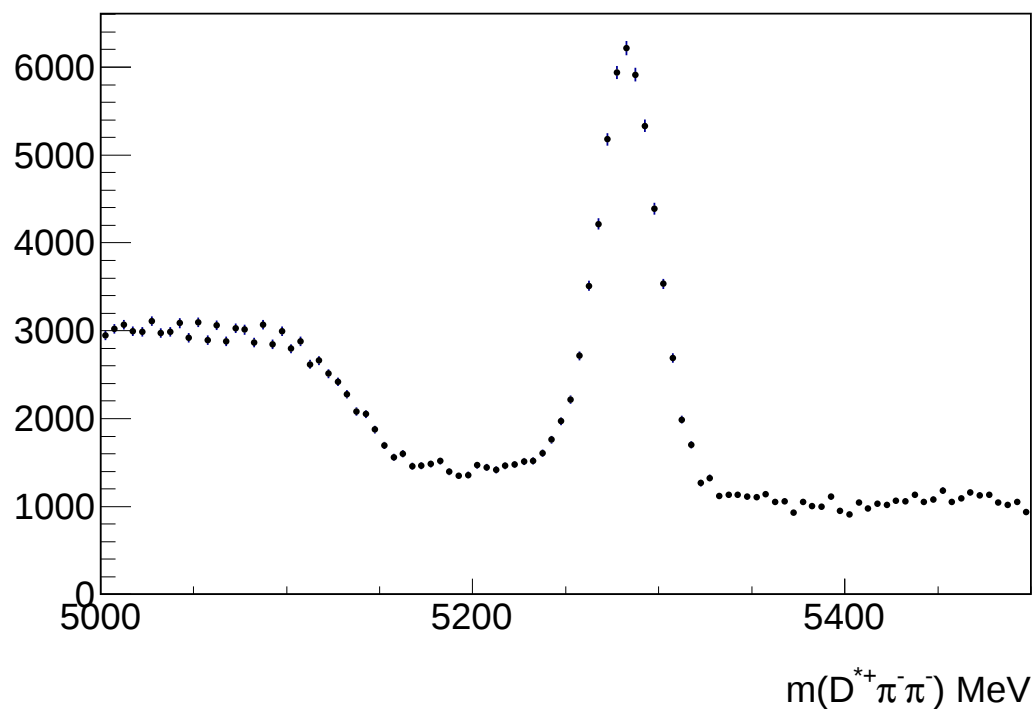
- Misura del branching fraction.

$$B = \frac{\mathcal{B}(D_{s2}^*(2573)^+ \rightarrow D^{*+} K_S^0)}{\mathcal{B}(D_{s2}^*(2573)^+ \rightarrow D^+ K_S^0)} = 0.044 \pm 0.006 \pm 0.008$$

- Misura delle distribuzioni angolari.

Nuove analisi (1). Spettroscopia del charm nei decadimenti dei B.

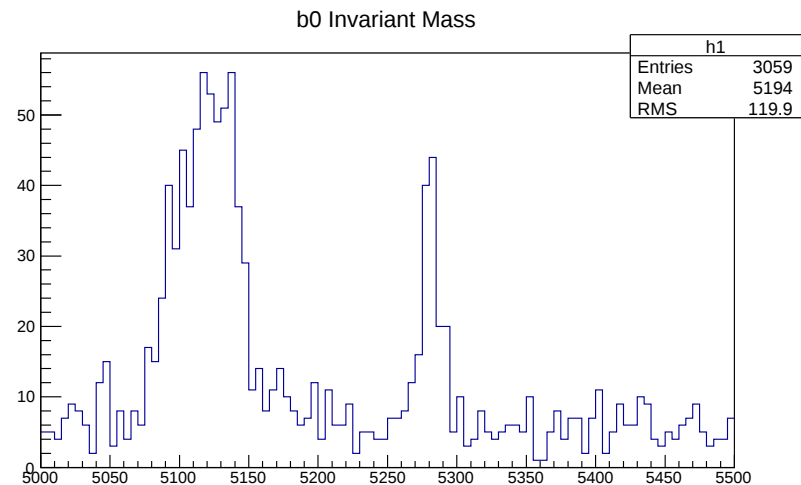
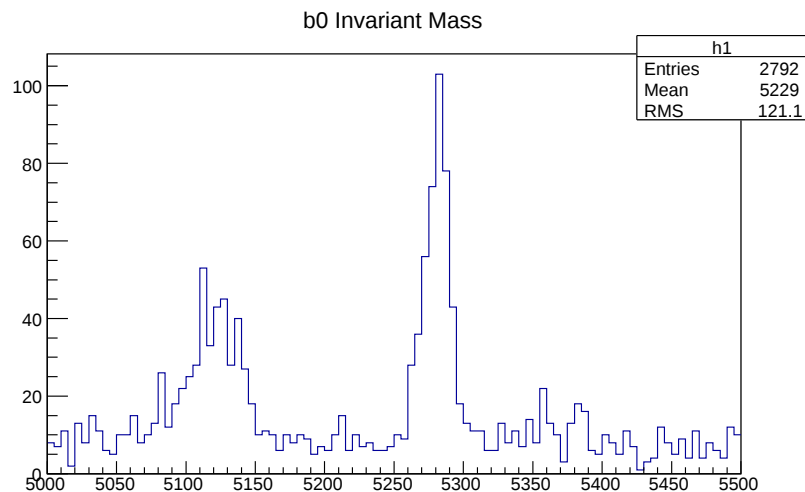
- Lavoro iniziato da poco, in collaborazione con M. Martinelli (Losanna).
- Analisi di Dalitz plot del $B^- \rightarrow D^{*+} \pi^- \pi^-$.
- Studiato da Belle con 500 eventi.
- Segnale in LHCb: 60000 eventi.



- Ricerca di nuove risonanze nel sistema $D^{*+} \pi^-$.

Nuove analisi (2). Spettroscopia del charm nei decadimenti dei B.

- Lavoro iniziato da poco, in collaborazione con M. Martinelli (Losanna).
- Ricostruzione degli eventi in corso.
- Analisi di Dalitz plot del $B^0 \rightarrow D^{*-} D^+ K_S^0$.
- Analisi di Dalitz plot del $B^+ \rightarrow D^{*+} D^0 K_S^0$.



- Ricerca di nuove risonanze nei sistemi $D^* K$ e DK .

Nuove analisi (3). $D_s^+ X$ charm spectroscopy.

□ (With M. Pappagallo) Study of the inclusive production of:

$$pp \rightarrow \mathbf{X}^- \quad (\mathbf{X}^0 \mathbf{D}_s^+) \rightarrow \pi^+ \phi \rightarrow K^- K^+$$

where $X^0 = \gamma, \pi^0, \pi^+ \pi^-, \eta, \dots$

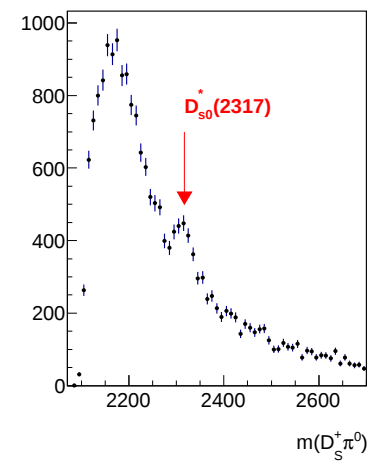
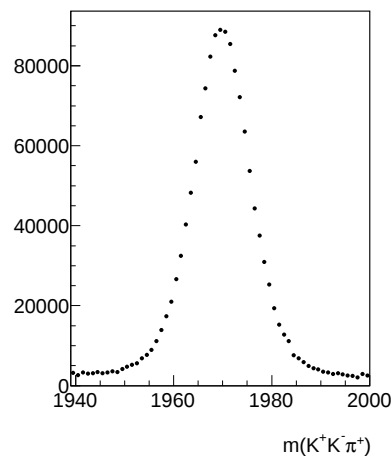
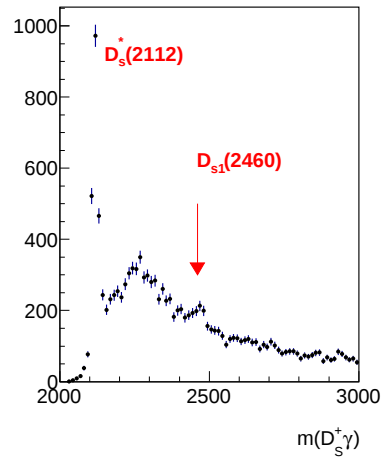
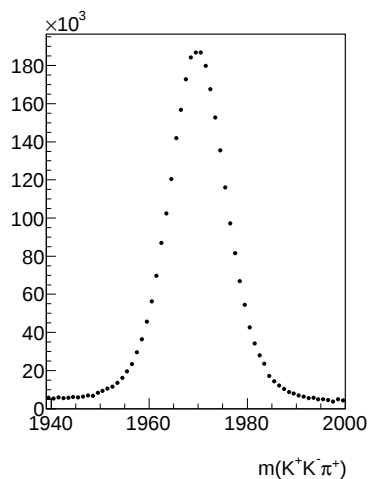
□ Stripping line D_s^+ + *complete event* (not scaled) included in Stripping21.

□ Aim is to study charm spectroscopy in the following final states:

$$D_s^+ \gamma, D_s^+ \pi^0, D_s^{*+} \gamma, D_s^{*+} \pi^0, D_s^+ \eta, D_s^{*+} \eta, D_s^+ \omega, D_s^{*+} \omega, D_s^+ \pi^+ \pi^-, D_s^{*+} \pi^+ \pi^-, \dots$$

Nuove analisi (3). $D_s^+ X$ charm spectroscopy.

- Some plots from Stripping20 tests.
- No real study, just arbitrary cuts. No mass constrained π^0 's.



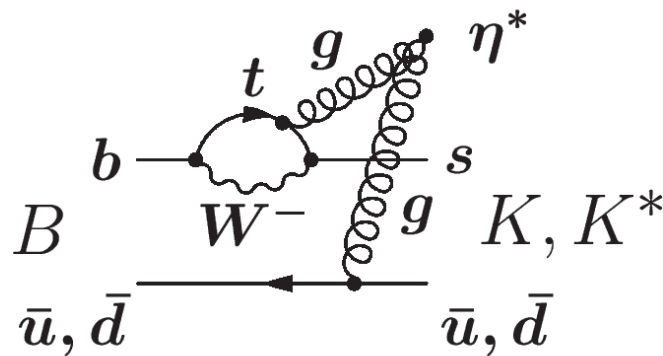
- γ 's reconstruction strongly improved in Stripping21.

Nuove analisi (4). $B^+ \rightarrow K^+ K_S^0 K^- \pi^+$

□ The possibility of searching for gluonium in B decays has been suggested by the experimental measurement of a large decay rate for:

$$B \rightarrow \eta' X, \quad B \rightarrow \eta' K$$

□ The diagram giving rise to these processes can be: (H. Fritzsch, Phys. Lett. B415 (1997) 83, P. Minkowski and W. Ochs hep-ph/0404194)



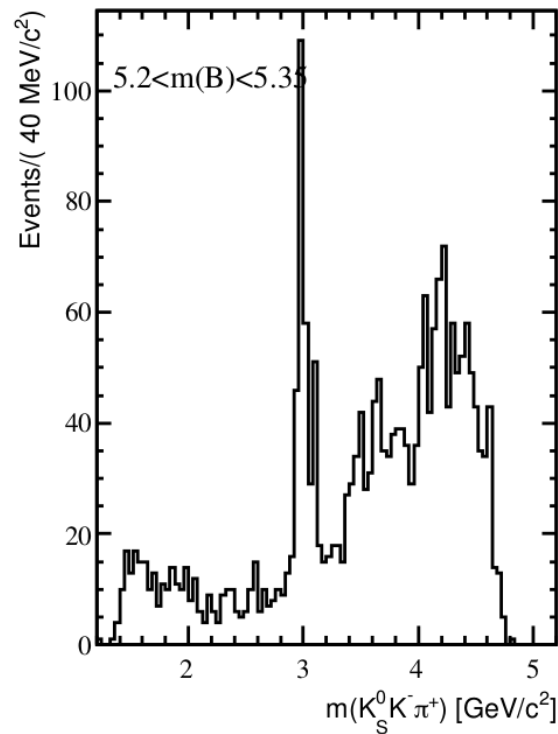
□ There are arguments in favour of a gluonic content of the η' , therefore gluonium states may be produced in B decays.

□ One channel of interest is:

$$B^+ \rightarrow K^+ \iota(1400) (\rightarrow K_S^0 K^- \pi^+)$$

Nuove analisi (4). Further interests in $B^+ \rightarrow K^+ K_S^0 K^- \pi^+$ analysis

- Search for CP violation using T-odd correlations.
- Dalitz plot analysis of $\eta_c \rightarrow K_S^0 K^- \pi^+$.
- Work with M. Martinelli (small sample of data).
- $K_S^0 K^- \pi^+$ mass spectrum in the B^+ signal region:



- Strong η_c and J/ψ signals.