



Identifiant de la contribution : 28

Type : non spécifié

## Kaon phenomenology, Delta I=1/2 rule and BSM kaon oscillations

*jeudi 15 janvier 2015 15:18 (14)*

Kaon physics provides us with highly-non trivial tests of the Standard Model and is a rich source of information for Beyond the Standard Model (BSM) phenomenology. CP violation is among the most intriguing phenomena in particle physics and is very well measured in kaon decays, but a complete and quantitative theoretical prediction is still missing. However, the RBC-UKQCD collaborations have made tremendous progress in the last few years toward the computation of the  $K \rightarrow \pi\pi$  amplitudes. I will present our work, including our new data points with physical quark masses. From our results, I will show a possible explanation of the  $\Delta I = 1/2$  rule. Finally, I will present our work on neutral kaon mixing, including the BSM contribution and the constraints it implies on the scale of new-physics.

### Summary

I report on our computation of  $K \rightarrow \pi\pi$  amplitudes, including new points with physical quark masses, and on  $K - \bar{K}$  oscillations within and beyond the standard model. I also show a possible explanation of the  $\Delta I = 1/2$  rule.

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**Classification par session :** Flavor Physics