# Open Discussion The Future of Kaon Physics

Workshop "Aiming for new heights with kaon"

# I. Theory progress

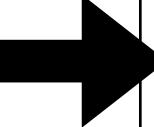
• Use Ks, interference, take ratio to K->πνν... [Avital Dery's talk]

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G. D'Ambrosio and T. Kitahara, Direct CP Violation in K \to \mu^+\mu^-, Phys. Rev. Lett. 119 (2017) 201802 [arXiv:1707.06999] [INSPIRE].
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A. J. Buras and E. Venturini, [arXiv:2109.11032]
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AD, M. Ghosh, Y. Grossman, S. Schacht, JHEP **07** (2021) 103, [arXiv:2104.06427]

- Need K-> $\mu^+\mu^-$ ,10^13 stat?
- Measure CKM w/o B-physics
- Trigger new exp activities



- What's more to be done for SM?
- connection with Lattice.

# II. New experimental ideas

• Use NA62 setup w/o upstream part [Radoslav Marchevski's talk]

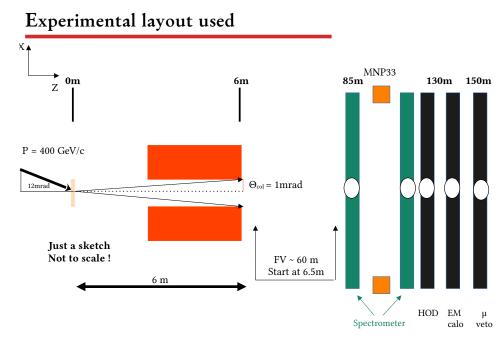
Experimental layout used

Large KL, KS, Λ

 $\star$   $K_L \sim 4 \times 10^{13} \text{ decays/year}$ 

 $\star$  K<sub>S</sub> ~  $3x10^{13}$  decays/year

 $\star$   $\Lambda \sim 1 \times 10^{13} \text{ decays/year}$ 



 Simultanous KL&Ks beam inspired by NA31/48 [Lau Gatignon's talk]

•  $K0=0.25(K^++3K^-)$ 

Prod. Angle (mrad)	K <sub>s</sub>	K <sub>L</sub>
0	7.0 1014	1.1 10 <sup>14</sup>
2.4	5.1 10 <sup>14</sup>	9.7 10 <sup>13</sup>
12	1.5 10 <sup>13</sup>	3.3 10 <sup>13</sup>

• If happens, rough timeframe?

# III. Relevant New Physics

Light NP (unique for Ks)
 Eg. light NP [Diego's talk]
 K0-> X1 X2 violating GN bound.
 How about for Hyperon?

- Heavy NP [Joachim Brod's talk]
- BSM unique for Hyperon? [Brod's talk] Axial current? Dark baryon, asymmetric dark matter.
- Leptoquark? [Avital's talk]
- Majorana neutrino mass [Andrzej Buras's comment]
- more ideas?

### IV. Exp challenges, more ideas&channels

- Synergy with HLLHC (high granularity)
- KS, hyperon at future LHCb?
- Other than  $K \rightarrow \mu + \mu ?$
- p pbar collision at rest for mixed Ks/KL [Augusto's comme]

Measure  $K_S \rightarrow \pi^0 |+|-$  precisely (1%? muon is better) Improve  $K_L \rightarrow \pi^0 |+|-$ 

LHCb can contribute to Ks