Contribution ID: **19** Type: **not specified**

Can we predict $B \to Ka$ decay rate without specifying UV physics?

Friday, September 27, 2024 2:40 PM (25 minutes)

We revisit the transition rate of $b \to s$ and a light axion-like particle a, to address overlooked contributions and ambiguities. Existing bottom-up approaches often lack clarity and predictive power. By recalculating the effective Hamiltonian in the minimal DFSZ model, we show that previous results are valid at one loop by coincidence, while significant two-loop contributions were missed. We then compare the DFSZ predictions with model-independent results and identify the sources of ambiguity. Finally, we argue that only with a specific choice of basis, the correct leading-log term can be derived in the bottom-up approach.

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Session Classification: Young Scientist Talks