Extracting γ from three-body charmless B-meson decays

Thomas Grammatico
Sorbonne Université, LPNHE, France
thomas.grammatico@lpnhe.in2p3.fr
co-authors : Eli Ben-Haïm, Emilie Bertholet*, Matthew Charles
∗ Tel-Aviv University, School of Physics and Astronomy,
Department of Particle Physics

January 31, 2020

The elementary particles and their interactions are well described by the Standard Model. Still, it is not completely satisfactory. For example, the asymmetry between matter and antimatter that is observed is not understood nor well described. B factories such as LHCb or BaBar experiments intend to explore the differences between matter and anti matter in order to explain why the latter is barely seen in our universe. Thus, studying the quarks mixing is an opportunity to mesure the asymmetry between matter and its counter part. It is described by the CKM matrix that contains quarks couplings when they interact through weak interaction. The unitarity of this matrice leads to 6 triangles, one being referred as the Unitarity triangle and containing the three angles: α, β and γ. The last one is the least known of them three. The state of the art gives $\gamma = (73.5^{+4.2}_{-5.1})^\circ$. It exists then a natural interest in probing new investigating methods for it. The goal is to check a new process in extracting gamma from B meson decays. One of the method method employed in the previous measurements implies a charm quark in the B decays. Such a process is dominated by Standard Model due to the tree level decay (diagram without loops). In the method developped by Bhubanjyoti Bhattacharya, Maxime Imbeault and David London, charmless B decays are considered, allowing for New Physics to kick in.

Key words : Beyond the Standard Model, CP violation and flavor physics