

How Unitarity in CKM Matrix of quark interactions was proven correct

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In 1993 a new Hyperon Beta Decay study was introduced into the KTeV experiment and although it only collected less than a 1000 events it had a major impact, because it was the first to show that the CKM matrix obeyed Unitarity. This new ideas was introduced by a new post-doc just starting his career and the 98% analyzing power of these Hyperon decays allowed us to study beta decay form factors and Branching ratio, which showed that the CKM matrix element V_{us} that had historically been used for 35 years was wrong and that this correction changed V_{us} by 6 sigma and brought a new understanding to quark flavor physics proving it obeyed Unitarity. Today this result has been confirmed by two subsequent measurements and Unitarity in the CKM matrix is a guide for a similar matrix in neutrino oscillation and continues to have an important impact on particle physics. This historical perspective shows that small new measurements can still be added to large experiments to produce major new important results.

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