

Abstract Submitted  
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**CKM unitarity: a pion perspective**<sup>1</sup> DINKO POCANIC, Institute for Nuclear and Particle Physics, University of Virginia, PIBETA/PEN COLLABORATION — Whether or not the 3-generation Cabibbo–Kobayashi–Maskawa (CKM) quark mixing matrix is unitary has significant implications for the standard model of particles and fields (SM). Most importantly, the degree to which CKM unitarity is preserved sets limits on several important classes of physics extensions of the SM. Nuclear probes have played a key role in the most precise tests of the CKM top row unitarity. Among these, the beta decay of the charged pion,  $\pi^+ \rightarrow \pi^0 e^+ \nu_e$  offers the theoretically cleanest means to determine the dominant  $V_{ud}$  CKM matrix element. We will examine the status, challenges and future prospects for  $V_{ud}$  determination in the pion sector.

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