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CP violation and the CKM matrix
Heavy quark mesons and baryons (incl. lattice calculations)
Experiment: ISTRA+ at U-70 PS, Protvino, Russia
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High statistics study of the K^- decays with the ISTRA+ setup at U-70.

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Abstract

The decays $K^- \to \pi^0 e\nu$; $K^- \to \pi^0 \mu\nu$ have been studied using in-flight decays detected with "ISTRA+" setup working at the 25 GeV negative secondary beam of the U-70 PS. About 130K events were used for the analysis of the $K^- \to \pi^0 e\nu$ decay and about 112K for $K^- \to \pi^0 \mu\nu$. The λ_+ and λ_0 slope parameters of the decays vector formfactors $f_+(t)$, $f_0(t)$ have been measured :
$\lambda_+ = 0.0321 \pm 0.004(\text{stat}) \pm 0.002(\text{syst})$
$\lambda_0 = 0.0209 \pm 0.004(\text{stat}) \pm 0.002(\text{syst})$; the correlation $d\lambda_0/d\lambda_+ = -0.46$
The limits on the possible tensor and scalar couplings have been derived:
$f_T/f_+(0) = -0.021 \pm 0.028(\text{stat}) \pm 0.014(\text{theory})$;
$f_S/f_+(0) = 0.004 \pm 0.005(\text{stat}) \pm 0.005(\text{theory})$.

From the limit for f_S the following constraint can be derived for 2HDM theories:
$\frac{tg(\beta)}{m_H} = 0.39 \pm 0.2(stat) \pm 0.2(theory) GeV^{-1}$.

Here m_H is the charged Higgs-boson mass; $tg(\beta) = v_2/v_1$- the ratio of the vacuum expectation values for 2 Higgs doublets. Our limit is comparable with that from LEP searches for the decay $b \to \tau\nu_\tau$.
In addition, we have performed a search for the decay $K^- \to \pi^-\pi^0 P$, P being pseudoscalar Sgoldstino. Our limit is $Br(K^- \to \pi^-\pi^0 P <\sim 10^{-5}$, for the P mass in the region
$0 < m_P < 130$ MeV.

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