Contribution ID: **98** Type: **Talk**

KLOE-2 results on hadron physics

Tuesday, 26 September 2017 17:30 (20 minutes)

The KLOE experiment has collected 2.5 fb^{-1} at the e^+e^- collider DAPHNE. The upgraded detector KLOE-2 has already collected 3.5 fb^{-1} with a new beam crossing scheme, allowing for a reduced beam size and increased luminosity. Analysis of KLOE data is still in progress, providing new important results in the light meson sector. VPgamma* transitions have been studied using the $\phi \to \eta e^+e^-$, $\phi \to \pi^0 e^+e^-$ decays. For both processes, we obtain the the most precise determination of the BR and of the transition form factor.

KLOE data have been also exploited to obtain a new, precise result on the isospin-violating decay $\eta \to \pi^+\pi^-\pi^0$, aiming to a better determination of the light-quark mass ratio. The analysis determines with very good accuracy the parameters of the decay matrix element. The Dalitz plot density is parametrised as a polynomial expansion up to cubic terms in X and Y. The measurement is sensitive to all charge conjugation conserving terms, providing an improvement of a factor of two on the statistical uncertainty of all parameters with respect to previous experiments. Smaller systematic uncertainties have been also achieved. The un-binned integrated left-right, quadrant and sextant charge asymmetries have also been measured, providing an accurate test of C parity conservation. The values extracted are consistent with zero at 10^{-4} level, thus improving existent evaluations.

Precision physics requires appropriate inclusion of higher order effects and the knowledge of very precise input parameters of the electroweak Standard Model. The running of the QED coupling constant alpha in the time-like region in the energy range 0.6-0.975 GeV has been measured for the first time using the KLOE detector. The result shows a clear contribution of the rho-omega resonances to the photon propagator with a significance of the hadronic contribution of more than 5 sigmas. For the first time the real and imaginary part of Delta(alpha(s)) have been extracted.

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Session Classification: QCD and hadron structure

Track Classification: QCD and hadron structure