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KLOE results on light meson properties

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The KLOE experiment has collected 2.5 fb-1 at the peak of the phi resonance at the e+e- collider DAPHNE in Frascati. The whole data set includes 100 million eta's produced through the radiative decay phi −> eta gamma and tagged by means of the monochromatic recoil photon. With this sample, we are studying eta rare decays. We have a final result for the BR
measurement of the eta −> pi+pi-e+e- decay, with a sample of 1600 signal events, 100 times larger than previous best measurement. These events are also used to measure the asymmetry between the pi+pi- and the e+e- decay planes in the eta rest frame, whose observation could test unexpected mechanism of CP violation, thus providing an hint of new physics beyond the Standard Model. The same four track final state is also under study to observe for the first time the eta −> e+ e- e+ e- decay channel.

Using a sample of 600 pb-1 collected at center of mass energy between 1000 and 1030 MeV, we have measured the cross section parameters for the two processes e+ e- −> pi+ pi- pi0 pi0 and e+ e- −> pi0 pi0 gamma, which proceed through the omega pi0 intemediate state. The ratio
Gamma(omega−>pi0gamma)/Gamma(omega−>pi+pi-pi0) is extracted with an accuracy of 1.8%. This measurement substantially improves the accuracy of the two corresponding branching fractions, giving a value for BR(omega−>pi0gamma) which is three standard deviation lower than the PDG fit. Moreover, the observed interference pattern at the phi peak is
used to extract the most precise measurement to date of the BR for the OZI and G-parity violating phi −> omega pio decay.

We have also new results in the scalar meson sector. We have the final measurement for the search of the phi −> K0 K0bar gamma decay, which proceeds through f0(980)/a0(980) gamma. No previous measurement of this decay mode exists. Theoretical predictions for the branching fraction are spread in the 10^(-7)−10^(-9) range. KLOE looks for Ks Ks gamma final state events, with both Ks decaying in pi+pi-. Results for the upper limit on the branching ratio are presented with the full KLOE statistics, which allows to test most of the available theory models. Moreover we have the final measurement of the high statistics results on the phi −> a0(980) gamma decay, with a0 in eta pi0 for two different eta final states, which provide the BR measurement and also the determination of the a0(980) coupling to eta pi and KK. The unfolded M(etapi) spectrum has been also extracted.

Finally, we have updated our measurement of the gluonium content of the eta' that indicated a 3 sigma's evidence. Other SU(3) relations were added in the fit of the vector to pseudoscalar gamma, pseudoscalar to vector gamma and pseudoscalar to gamma gamma transitions, thus allowing the extraction of other parameters, such as the vector mixing angle and the SU(3) breaking parameter 2*ms/(mu+md). The effect of including the pseudoscalar to two gammas
decay amplitudes on the fit result is also discussed.

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