Contribution ID: **55** Type: **Parallel-Hadron Structure**

Hadron physics results at KLOE-2 experiment

KLOE and KLOE-2 data (almost 8 fb^{-1}) constitute the largest sample ever collected at an electron-positron collider operating at the ϕ peak resonance.
In total it corresponds to the production of about 24 billion of ϕ mesons whose decays include about 8 billion pairs of neutral K mesons and about 300 million η mesons.
A wide hadron physics program, investigating rare meson decays, $\gamma-\gamma$ interaction, dark forces and hadronic cross section, is thus carried out by the KLOE-2 Collaboration.

The $\eta \to \pi^0\gamma\gamma$ decay is a test bench for various models and effective theories like VMD (Vector Meson Dominance) or ChPT (Chiral
Perturbation Theory) which predict BR far from experimental value. KLOE-2, with its highly pure η sample produced
in $\phi \to \eta\gamma$ process, has a new preliminary measurement of this branching ratio.
Following the many contributions KLOE and KLOE-2 has done to Dark Matter searches, an alternative model, where the Dark Force mediator is an hypothetical leptophobic B boson, is investigated in the $\phi \to \eta B \to \eta\pi^0\gamma\,, \eta \to \gamma\gamma$ channel.

A KLOE-2 distinctive feature is also the the possibility to investigate π^0 production from $\gamma\gamma$ scattering by tagging final-state leptons from $e^+e^- \to \gamma^*\gamma^*e^+e^- \to \pi^0e^+e^-$ in coincidence with the π^0 in the barrel calorimeter. KLOE-2 aims to use this process to precisely measure the π^0 decay width into $\gamma\gamma$ to test low-energy QCD dynamics. Progresses made on the $\gamma^*\gamma^* \to \pi^0$ event counting will be reported.

A search for the P and CP violating decay $\eta \to \pi^+\pi^-$ has been recently published by KLOE-2 using 1.6˜fb^{-1} of KLOE data.
No signal is observed in the $\pi^+\pi^-$ invariant mass spectrum, and the
upper limit on the branching fraction at 90\% confidence level is B($\eta \to \pi^+\pi^-$)$< 4.9 \times 10^{-6}$, which is three times lower than previous KLOE result. A combination of the two KLOE limits will be presented.

Moreover, the search for the double suppressed $\phi \to \eta\,\pi^+\pi^-$ and the conversion
$\phi \to \eta\,\mu^+\mu^-$ decays are performed at KLOE-2 with both $\eta \to \gamma\gamma$ and $\eta \to 3\pi^0$ final states. Clear signals are seen for the first time.

Finally, preliminary and promising results on the ω cross section measurement in the $e^+e^- \to \pi^+\pi^-\pi^0\gamma_{\rm ISR}$ channel using the Initial State Radiation (ISR) method will be also presented.

Primary author: MANDAGLIO, Giuseppe (University of Messina)

Presenter: MANDAGLIO, Giuseppe (University of Messina)