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The KLOE-2 experiment at DAFNE

Monday, 6 June 2016 12:00 (0:30)

Collaboration

KLOE-2

Abstract content

The KLOE-2 experiment at the INFN Laboratori Nazionali di Frascati (LNF) is currently taking data at the upgraded e^+e^- DAFNE collider. Present Run II follows a development phase to assess the feasibility of a long term acquisition program, Run I, which successfully ended in July 2015 with 1 fb^{-1} integrated luminosity collected in less than eight months. For the first time the "crab-waist" concept – an interaction scheme, developed in Frascati, where the transverse dimensions of the beams and their crossing angle are tuned to maximize the machine luminosity – has been applied in presence of a high-field detector solenoid. Record performance in terms of 2 x 10^{32} $cm^{-2}s^{-1}$ peak luminosity and 12 pb^{-1} maximum daily integrated luminosity were achieved with this innovative scheme of beam collisions, which will be employed in the upgrade of the B-factory currently under construction at the KEK Laboratory, in Japan, and is also considered a valid option in several future projects.

KLOE-2 represents the continuation of KLOE with a new physics program mainly focused on the study of K_s, η and η' decays as well as on kaon interferometry, test of discrete symmetries, and search for physics beyond the Standard Model. The new data taking campaign aiming to collect more than 5 fb^{-1} integrated luminosity in the next 2-3 years, will allow to perform CPT symmetry and quantum coherence tests using entangled neutral kaons with an unprecedented precision, high precision studies of $\gamma\gamma$-physics processes like $e^+e^- \to e^+e^-\pi^0(\gamma\gamma \to \pi^0)$, and the search for signals of a hidden dark-matter sector, among the fields to be addressed. The general purpose KLOE detector, composed by one of the biggest Drift Chamber ever built surrounded by a lead-scintillating fiber Electromagnetic Calorimeter among the best ones for energy and timing performance at low energies, undergone several upgrades including State-of-The-art cylindrical GEM detector: the Inner Tracker. To improve its vertex reconstruction capabilities near the interaction region, KLOE-2 is the first high-energy experiment using the GEM technology with a cylindrical geometry, a novel idea that was developed at LNF exploiting the kapton properties to build a transparent and compact tracking system. To study $\gamma\gamma$-physics the detector has been upgraded with two pairs of electron-positron taggers: the Low Energy Tagger (LET), inside the KLOE apparatus, and the High Energy Tagger (HET) along the beam lines outside the KLOE detector. An overview of the KLOE-2 experiment will be given including present status and achievements together with physics plans.

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