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Séminaire SPP

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CEA-Saclay Bat 141, salle André Berthelot

Circular Higgs Factories : LEP3, TLEP and SAPPHIRE

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In 2012 two LHC experiments have discovered a new particle with a mass around 125 GeV, which might be the scalar Higgs boson of the Standard Model. This particle could be produced in large numbers for precision studies by an e+e- collider operating near the ZH threshold at a beam energy of 120 GeV or, in the s-channel, by a gamma-gamma collider with primary electron beam energies of 80 GeV. In this seminar I will discuss tentative design parameters, novel concepts and accelerator-physics challenges for two circular e+e- Higgs-factory colliders - LEP3 and TLEP - and for a gamma-gamma Higgs-factory collider based on a recirculating SC electron linac - SAPPHiRE. LEP3, installed in the existing 27-km LHC tunnel, and TLEP, in a new 80-km long tunnel, require - in addition to the collider ring - a fast cycling accelerator ring for quasi-continuous top-up injection to compensate the short beam lifetime due to radiative Bhabha scattering at luminosities above 1e34 cm-2s-1. They also need a large momentum aperture to ensure an adequate beam lifetime with regard to beamstrahlung. The 80-km tunnel of TLEP could later accommodate a very high energy LHC ("VHE-LHC"), with a centre-of-mass energy approaching 100 TeV in pp collisions. An important challenge for SAPPHiRE is the layout of the interaction region and the generation of the high-power photon pulses needed for Compton back scattering. These photon pulses, which collide with the electron beams about 1 mm from the interaction point proper, could be produced either by a conventional laser together with an optical stacking cavity or, more intriguingly, by an FEL process, possibly driven by the 80-GeV electron bunches themselves. SAPPHiRE could be reconfigured as "LHeC" (or vice versa), providing a 60-GeV electron beam of higher current in energy-recovery mode to collide with one of the LHC hadron beams. SAPPHiRE could also be based on infrastructures and expertise available at DESY, FNAL, KEK or TJNAF.

Le café sera servi 10 minutes avant.

NB : La présentation d'une pièce d'identité est exigée à l'entrée du centre. Tous les auditeurs extérieurs sont priés de prévenir à l'avance Martine Oger, tél. 01 69 08 23 50, e-mail : `martine.oger@cea.fr`. (U.E. : délai de 24 h, hors U.E. : délai de 4 jours).