The analysis equations for upgrading the OK are given. The interested induction field is checked by the finite element computation, the 3-dimensional electromagnetic computation software, Opera-3d. The measured B- H curve of the magnet is used in the computation. The typical parameters of the upgraded optical klystron are given. The magnet gaps of the three OK undulator sections can be independently tuned from 40mm to 140mm. The experimental facilities to measure the coherent harmonic of the OK are given.

Chinese High Technology Projects 864-410

WPPH307 The Application of the Closed Undulator in Hefei Light Source

GE LI (NATIONAL SYNCHROTRON RADIATION LAB), YINGUI ZHOU, SAI DONG, DUOHUI HE, YONG WANG (UNIV. OF SCI. & TECH. OF CHINA)

The short period undulator with strong induction field can enhance the brilliance of the synchrotron radiation storage ring significantly. The high brilliance undulator emission with higher photo energy in Hefei 800MeV storage ring is calculated with the simulated induction field of Opera-3d. The fundamental and harmonic emission generated by the traditional in-vacuum undulator at the minimum gap of 20mm is from 2nm to 30nm, which covers the "water windows" spectrum used for material and life sciences. Realizing above possibility with the closed undulator concept in Hefei 800MeV storage ring is explored and proposed, which avoids high costs of present in-vacuum undulator system. Some vacuum tests, which are used to verify the engineering possibility of the concept, are completed. The model is simulated by the finite element computation, the 3-dimensional electromagnetic computation software, Opera-3d. Possible science and technology fields using the light of the closed undulator is explored.

WPPH308 The Closed Undulator

GE LI (NATIONAL SYNCHROTRON RADIATION LAB)

Undulator is core device in modern synchrotron radiation sources and FEL. In-vacuum undulator, which has merits of strong induction field with short periods realized by implementing filmed permanent magnets into vacuum room to eliminate the limitation of the thickness of the vacuum chamber, generate more brilliance undulator light with higher energy from the existing light sources. Realizing the performance of in-vacuum undulator with the concept of closed undulator by putting permanent magnets outside vacuum room is explored. The iron material is used as poles to transfer the flux of permanent magnets into vacuum chamber. The changing of induction field could be realized by transferring variable flux to poles. The model is simulated by 3-dimensional electromagnetic computation software, Opera-3d. The cons and pros of the concept with the traditional in-vacuum undulator are discussed.

WPPH309 Permanent Magnets and Iron Material in Accelerators

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Storage Rings have very high vacuum system that is the normal operation condition of accelerators. Using permanent magnets or the iron material in the vacuum system can increase the performance of the accelerators significantly, such as in-vacuum undulators which implement filmed permanent magnets into vacuum system to increase the performance of synchrotron radiation facilities, iron material used in the kicker of the injection system which decrease much costs of its pulsed power supply and even more stable permanent magnet storage ring which could avoid the costs and failures of power supplies. Vacuum process and measurements of the materials found bases for them to be used in accelerators. Some vacuum performance tests, which are used to value vacuum cost of permanent magnets and the iron material in accelerators, are done. Realizing in-vacuum undulator concept with permanent magnets outside vacuum room is explored. The iron material is used to transfer the flux of permanent magnets into vacuum chamber.

Chinese High technology Program 863-410

WPPH310 Three-Dimensional Magnetic Field Analysis of a Variably Polarizing Undulator

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An APPLE-II type variably polarizing undulator with a period length of 60 mm will be installed in the Super-SOR ring (the new name of the VSX ring), a Japanese third-generation vuv and soft x-ray synchrotron light source being planned by the University of Tokyo. The magnetic structure of the undulaor was designed by three-dimensional analysis of the magnetic field and the calculated magnetic field was used for calculation of photon spectra and estimation of effects on the electron beam. Effects of the iron bars supporting the magnet structure on the magnetic field were also studied in three polarization modes: horizontal, circular and vertical. Furthermore dynamic magnetic field due to eddy currents of the undulator vacuum chamber were calculated for 1-Hz switching from right to left circular polarization. In this paper, we will report the results of three-dimensional magnetic field analysis of the variably polarizing undulator.

WPPH311 Accelerator Based Neutron Source for the Neutron Capture Therapy at Hospital

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An accelerator source of epithermal neutrons for the hospital-based boron neutron capture therapy is proposed and discussed. Kinematically collimated neutrons are produced via near-threshold 7Li(p,n)7Be reaction at proton energies of 1.883 - 1.9 MeV. Steady-state accelerator current of 40 mA allows to provide therapeutically useful beams with treatment times of tens of minutes. The basic components of the facility are a hydrogen negative ion source, an electrostatic tandem accelerator with vacuum insulation, a sectioned rectifier, and a thin lithium neutron generating target on the surface of tungsten disk cooled by liquid metal heat carrier. Design features of facility components are discussed. The possibility of stabilization of proton energy is considered. At proton energy of 2.5 MeV the neutron beam production for NCT usage after moderation is also considered. First experimental results are presented. The project is supported by ISTC. A pool of experience lets us consider the project to be feasible.

WPPH312 The SW Accelerating Structure of Variable Energy Electron Linac for Medical Application

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The SW, biperiodic, on axis coupled accelerating structure operating in pi/2 mode has been designed and constructed. It will be used for a new medical electron linear accelerator with the following parameters: Electron energy 6, 9, 12, 15, 18 MeV; Dose rate up to $ Gy/mim/m. Electron energy for photon generation 6 and 15 MeV; X-ray dose rate up to 3 Gy/mim/m.