MPPH103 RF System for the LNLS Injector Synchrotron

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We present the RF system for the 500 MeV Booster of the LNLS synchrotron light source. The heart of the RF system is a home-made narrowband MOSFET based solid state amplifier which delivers up to 900 W RF power to the 476 MHz Elettra-type RF cavity of the booster. The amplifier is made up of 5 conveniently combined modules, each module being able to deliver up to 230 W at 476 MHz. The system also includes the usual feedback loops for amplitude and phase controls.

MPPH104 Design Study on the RF Source for KOMAC

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A study on the design of 700 MHz, 1 MW CW klystron amplifier for KOMAC (KOrea Multipurpose Accelerator Complex) proton accelerator has been carried out by KAPRA (Korea Accelerator and Plasma Research Association). A triode type electron gun including a modulating anode, six cavities including one second harmonic cavity and electromagnet for electron beam focusing were designed to produce desired output rf power. Thermal analysis at the collector according to the magnetic field profile near the collector side pole face was performed to efficiently cool the heat generated through the kinetic energy loss of the electron beam. The effect of the shape and size of the output coupler on the coupling coefficient was analyzed by numerical method. The fabrication procedures and methods were investigated according to the design parameters. In addition to the design study, operation experiment of the klystron for broadcasting whose output power was 15 kW and frequency range 574 - 698 MHz was performed at 700 MHz. In this paper, the results of the design study and the operation experiment of the klystron for broadcasting at 700 MHz are presented.

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MPPH105 High Power Seventh Harmonic Converter at 20 GHz

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A harmonic converter utilizing a two-cavity system has been designed and is currently under construction. The converter uses a 250 kV, 20 A beam injected into a cavity tuned to the TE-111 mode at 2.856 GHz. The beam is accelerated in the first cavity via cyclotron resonance using 7.3 MW of rf power to an energy of 610 kV with 99% efficiency. The accelerated beam passes to an output cavity tuned to the TE-711 mode where 3.4 MW of 19.992 GHz rf power is predicted. Loaded Q's for the cavity are respectively 130 and 830. RF conversion efficiency is predicted to be 46% and overall device efficiency is about 28%. Details of the design, construction and initial results will be presented as well as discussion extending results to higher power.

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MPPH106 RF Power Recovery Using CARA and Depressed Collector

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A device consisting of a cyclotron autoresonance accelerator (CARA) which has been demonstrated to absorb greater than 95% of the incident rf power onto an electron beam [M.A. LaPointe, et. al., Phys. Rev. Lett., 76, 2718 (1996)] and a single stage depressed collector is being tested to recover rf power (e.g. rf regenerated from a spent FEL beam)and converting it to dc power. A 50kV, 5A beam is injected into CARA and up to 1 MW of 2.856 GHz rf is absorbed resulting in a 245 kV, 5A beam. For the experiments described here the collector is self depressed using a variable resistor stack to adjust the depression voltage to a value up to 170 kV. The collection efficiency for this device, predicted to be about 60%, is determined primarily by the efficiencies of CARA (97.5%) and the collector (69%) with a correction due to the presence of the intermediary beam (7%). Details of the current device and results and a discussion of possible applications will be presented.

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MPPH107 Status of X-Band Pulsed Magnicon Project

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A frequency-doubling magnicon amplifier at 11.4 GHz has been developed and built as the prototype of an alternative microwave source for the Next Linear Collider project, and to test high power active rf pulse compressors, RF accelerating structures, etc. The tube is designed to produce ~60 MW at 60% efficiency and 59 dB gain, using a 470 kV, 220 A, 2 mm-diameter beam. RF conditioning of this tube began in November, 2000, following the completion of a set of measurements of the gun perveance and electron beam diameter, with high-power operation underway early in 2001.

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MPPH108 34 GHz Pulsed Magnicon Project

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A high efficiency, high power magnicon at 34.272 GHz has been designed as a radiation source to develop RF technology for future multi-TeV electron-positron linear colliders. To develop this technology, it is necessary to test accelerating structures, RF pulse compressors, RF components, and to determine limits of breakdown and metal fatigue. The tube is designed to provide a peak output power of ~45 MW in a 1.5 microsecond pulse, and a gain of 55 dB using 500 kV, 220 A, 1 mm-diameter electron beam. The electron gun is successfully tested, and the RF structure is built to specifications. All another components will be delivered in the first quarter of 2001. High power operation is anticipated in the summer 2001.

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MPPH109 Carbon Nanotube-Based Cathodes for Microwave Tubes

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This paper describes the approach and apparatus for realizing and testing field emission cathodes based on carbon nanotubes for microwave tubes. These are intended to replace thermionic cathodes, avoiding their cost and fabricational difficulties while producing pulse current densities at least 10 A/cm^2. The carbon nanotubes are