



Graduate Physics Seminar  
Monday, 11 June 2012 from 4 PM  
University of Nova Gorica  
Vipavska 13, Rozna dolina, Nova Gorica  
SP-1 Lecture room

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## **Phase Shifters for Free Electron Lasers**

### **Abstract**

Fourth generation light sources or free electron lasers are becoming more and more popular, since they can produce very high x-ray photon fluxes in a narrow and extremely coherent beam. To achieve lasing in a periodic magnetic structure, the length of structure must be on order of several tens of meters. Such a long magnetic structure is impossible to be realized as a single device, so it has to be divided into sections with lengths of 2 to 5 meters. Spacing between these devices is also required for additional electron beam control and diagnostics. Efficiency of the lasing process in a free electron laser depends also on the matching phase between the electron beam and the emitted radiation, so it is necessary to control the electron beam drift when it is between magnetic structures. Phase slippage of the electron beam in free space can be controlled with a device called a phase shifter. These devices are characterized by a short periodic magnetic structure extending to one or two sinusoidal periods. Their strength can be adjusted in order to control the slippage of the electron beam with respect to the co-propagating electromagnetic field. In my seminar I will present the basic physics concepts of phase shifter operation and explain how they can be used for improving the free-electron laser performance.