

# **ACCELERATOR SEMINAR**

## **“Studies of Resistive Wall Heating at the JLab FEL”**

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Resistive wall induced wake fields is one of the important collective effects in accelerators which limits the performance of high intensity beams. During the high power operation of the JLAB IR FEL, heating of wiggler chamber is observed. Because of the narrow gap used for the FEL wiggler chamber, and the high peak and high average current of the electron beams, resistive wall effect is considered to be the major potential cause of the observed heating. In this presentation, we will discuss the mechanism of resistive wall heating, and compare the experimental observation with the existing theoretical results using the JLAB FEL parameters. We will show that the JLAB FEL operates at an interesting parameter regime for resistive wall impedance; hence it is necessary to evaluate the contribution of various effects, such as local and long range interaction, DC and AC scenarios, anomalous skin effects, non-ultrarelativistic effects, and effects of circular and flat geometry of the waveguide cross section. We will present our recent analysis which extends the theory of resistive wall impedance to the case of two parallel plates for non-ultrarelativistic beams. Other possible mechanisms for the heating will also be highlighted.

**Coffee before seminar at 10:45 a.m.**

**Tuesday, March 14, 2013  
11:00 a.m.  
CEBAF Center, Room F113**