

John Adams Institute for Accelerator Science Lecture Series

Monday 23rd September 2013 at 2:30pm
Seminar Room, Denys Wilkinson Building

20 Kelvin cold High gradient RF gun

The lecture will be delivered by

Vladimir Vogel,
DESY

Abstract: Heating and thermal expansion in the normal conductivity RF photo-electron gun are the main limitations to achieve high accelerating gradient in the RF gun. The big problems with water cooling, the temperature rising of gun surface during RF pulse and changing the resonance frequency of cavity prevent us from getting a stable beam with low emittance for the long RF pulse. Some pure materials show a significant increase in thermal conductivity and low resistance with a small coefficient of temperature expansion at temperatures around 20 degrees Kelvin. Feasible materials are Molybdenum, Iridium and Tungsten. However, machining of these materials is very difficult. Therefore we propose a use of hard materials with simple shape inside L-band RF gun made from pure copper. We expect to achieve a significant increase in gradient for similar RF power as used in the present long pulse RF guns. On the other hand, it would also be possible to increase the duty cycle while keeping a moderate gradient.

