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CLIC Breakdown Studies TWIKI page

Welcome to the CLIC Breakdown Studies main TWIKI page. This page contains some basic information about the breakdown activities under the CLIC experiment, especially information which is useful for the people involved, such as experimental/simulation results, "clipart gallery" which is useful for presentations etc., links to useful references, and in general anything you feel belong here.

DC spark experiment

There are currently three DC spark systems. System I, System II and the Fixed Gap System (FGS). Both System I and System II contain a cylindrical anode with a hemispherical tip and a planar cathode in ultra high vacuum. System I is currently being used in conjunction with the High Rep Rate Supply (HRRS) which uses a solid state switch to apply a voltage of up to 10kV to the electrode gap at a repetition rate of up to 1kHz. System II is currently being used to test both the Temperature Controlled Sample Holder (TCSH) and a New Gap Measurement Method (NGMM).

Whereas the diameter of the anode in Systems 1 and 2 is 2.3mm. The FGS contains two nearly identical electrodes for which the diameter of the high field area is 80mm. The rationale behind this much larger high field area is to more closely approximate the conditions during a high power RF test of an accelerating cavity where a breakdown can occur at any point over a large area. The FGS is currently under vacuum but has yet to be tested.

All data taken with these systems is available at

https://dfsweb.web.cern.ch/dfsweb/Services/DFS/DFSBrowser.aspx/Divisions/EST/Groups/SM/ThinFilms/CLIC_Spar

System I

The manual for system 1 and the associated elements can be found here.

System II

The manual for system 2 and the associated elements can be found here.

simulation

The ArcPic2D simulation software attempts to simulate the early stages of breakdown and plasma formation in the DC spark system. It is an electrostatic Particle-In-Cell (PIC) code with Monte Carlo collisions between the macro-particles. This simulation uses a 2D cylindrical symmetric coordinate system with co-planar electrodes on a uniform finite-difference grid. Particle boundary conditions, field boundary conditions (circuit models), and particle initial conditions are handled with easily swappable classes, enabling agile code development.

The code currently runs on one single CPU only. <http://crd-legacy.lbl.gov/~xiaoye/SuperLU/> [SuperLU] is used to solve Poisson's equation.

The most up-to-date version of the code is found on CERN's SVN (restricted access):

<https://svnweb.cern.ch/cern/wsvn/arcpic/pic2d/trunk/> and a typical input file looks like:

<https://svnweb.cern.ch/cern/wsvn/arcpic/pic2d/trunk/input.txt>

A more complete documentation is found at: <http://cdsweb.cern.ch/record/1354562?ln=en>

Simulation run log: BreakdownStudiesArcPic2dRunlogs

Useful references

This section contains links to references usefull for our work, such as

This topic: CLIC > BreakdownStudies

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