Università degli studi di Torino

SCUOLA DI SCIENZE DELLA NATURA

Corso di Laurea Magistrale in Fisica

Tesi di Laurea Magistrale

TESTING OF THE TD26 TYPE CAVITY UNDER BEAM LOADING FOR THE CLIC PROJECT

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???

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Considerate la vostra semenza:
fatti non foste a viver come bruti,
ma per seguir virtute e canoscenza

Dante, *La Divina Commedia*
Canto XXVI

Abstract

A new generation of colliders capable of reaching TeV energies is under development nowadays, and to succede in this task is necessary to show that the technology for such machine is available. The CLIC project is one of the most advanced design among the possible lepton colliders, and is formed by two normal conducting LINACs. To reach such high energies are necessary accelerating structures carrying gradient beyond 100MV/m and one of the biggest limitations is developing accelerating structures that present a sufficient low occurrence of vacuum arcs. This is pursued both with the design and the *conditioning*, which is the process of increasing the resilience to vacuum arcs of a structure using repetitive RF pulsing sessions.

The focus of this work is on the breakdown rate testing of the TD26 type cavity with and without beam presence inside. At CERN this test has been carried out on the cavity installed in the *dogleg* line in the CLIC-test-facility 3 (CTF3), and connected on the RF side to the X-band test stand 1 (Xbox1).

Other peculiar properties of the operation have been studied also, such has beam-induced RF generation into the cavity after the breakdowns, breakdown migration, ...

Italian abstract

(Translate once you have the ok to the english one)

Contents

Introduction

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0.1 The CLIC poject and the CTF3 facility

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0.2 Scope and outline of the thesis

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0.3 Goals

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Chapter 1

Theoretical background

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1.1 Vacuum arcs

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Here I want to test[1] some[2] quote[3]

1.1.1 General background

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[1] first foot note

[2] another foot note

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1.1.2 Applications in particle accelerators

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1.1.3 Interaction with the RF

1.2 Signal processing techniques

In lobortis augue porta dui venenatis sollicitudin. In sagittis quis ipsum non dictum. Sed tempus, quam non vehicula dictum, mauris nisl posuere metus, eu lobortis odio risus at dui. Nullam non ante vulputate nulla ultrices euismod eu a diam. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Nulla nec augue a risus viverra mattis. Ut tincidunt egestas nulla at semper. Fusce pretium, leo quis consectetur viverra, arcu lectus ornare leo, quis commodo ex risus sit amet velit. Nullam finibus lorem in mi tincidunt, sed feugiat lectus tincidunt. In hac habitasse platea dictumst. Sed quis auctor odio, at sodales nunc. Donec vulputate massa sit amet dolor sollicitudin, vel pretium quam scelerisque. Nullam et massa eleifend, venenatis ante vitae, ornare libero. Suspendisse potenti. Nam ante lacus, porttitor vel turpis quis, pellentesque auctor velit.

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Chapter 2

Experimental setup

2.1 The LINAC and the Dogleg

Bullet list example

- first point
- second point
- third point

2.2 RF power generation

Enumeration example

1. first point
2. second point
3. third point

Description example

first descr first point

second descr second point

third descr third point

2.3 DAQ system

2.3.1 Hardware

2.3.2 Online selection of the events

describe the online, but then the offline is in the next chapter
. . . but you can also build nested lists

- first point
  - first point
  - second point
- second point
- third point

2.4 Other systems

mention here thermal systems for the structure and something else ???

Chapter 3

Data analysis tools

3.1 Offline selection of the events

A tabular example

Tit1	Tit2
el1	el2
el1	el2
el1	el2

but tabulars cannot be captioned ! (are in text elements)

Using the table environment, the caption works ! BUT BECOMES FLOATING OBJECTS (in fact is on the bottom of the page due to no more text inserted afterwards).

Same thing for the figure environment

3.2 Time and space positioning of the breakdowns

3.3 Migration of the breakdowns

3.4 Beam induced RF

3.5 Neural network based events selection

1	2	3
4	5	6
7	8	9

Table 3.1: A simple table

Chapter 4

Results and future developments

4.1 Results

A figure example, with text in line (NO CAPTION)

A figure example, with floating object and caption

4.2 Further developments

Figure 4.1: the logo of UniTo

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Bibliography

[1] A. Einstein, "Zur Elektrodynamik bewegter Körper. (German) [On the electrodynamics of moving bodies]," *Annalen der Physik*, vol. 322, no. 10, pp. 891–921, 1905.

[2] M. Goossens, F. Mittelbach, and A. Samarin, *The LaTeX Companion*. Reading, Massachusetts: Addison-Wesley, 1993.

[3] D. Knuth, "Knuth: Computers and typesetting."