Ziemlich langer Titel der studentischen Arbeit

Masterarbeit
Willi Wichtig
KOM-type-number

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Fachbereich Elektrotechnik
und Informationstechnik
Fachbereich Informatik (Zweitmitglied)

Fachgebiet Multimedia Kommunikation
Prof. Dr.-Ing. Ralf Steinmetz

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Technische Universität Darmstadt
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Hiermit versichere ich, die vorliegende Masterarbeit ohne Hilfe Dritter und nur mit den angegebenen Quellen und Hilfsmitteln angefertigt zu haben. Alle Stellen, die aus den Quellen entnommen wurden, sind als solche kenntlich gemacht worden. Diese Arbeit hat in dieser oder ähnlicher Form noch keiner Prüfungsbehörde vorgelegen. Die schriftliche Fassung stimmt mit der elektronischen Fassung überein.

Darmstadt, den 31. Dezember 2013 Willi Wichtig

Contents

Abstract

The abstract goes here...

1 Introduction

Some short information how to get started:

- Download the `tuddesign` files from `http://exp1.fkp.physik.tu-darmstadt.de/tuddesign/`, these are required to run any of the KOM templates!
- Open the main file of your template document and adjust the section containing the main document information. Afterwards, it might also be a good idea to adjust the filenames to your needs.
- For your convenience, common LaTeX examples are included with the template and can be found in the file `content.tex`.
- Carefully check the comments included in the LaTeX sources of the template and the manual of `tuddesign` (for general problems with `tuddesign` it is a good idea to visit the forum on their website). General LaTeX problems should be resolved via the web, manuals, or the corresponding usenet groups (`de.comp.text.tex`, `comp.text.tex`).

2 Examples

BibTEX-Test: [10] Steinmetz and Wehrle [10]

2.1 Another Section in This Chapter

Non vices medical da. Se qui peano distinguer demonstrate, personas internet in nos. Con ma presenta instruction initialmente, non le toto gymnasios, clave effortio primarimente su del.[1] Chapter 2

2.1.1 Personas Initialmente

Uno pote summario methodicamente al, uso debe nomina hereditage ma. Iala rapide ha del, ma nos esser parlar. Maximo dictionario sed al.

A Paragraph Example

Uno de membros summario preparation, es inter disuso qualcunque que. Del hodie philologos occidental al, como publicate litteratura in web. Veni americano Knuth [7] es con, non internet millennios secundarimente ha. Titulo utilitate tentation duo ha, il via tres secundarimente, uso americano initialmente ma. De duo deler personas initialmente. Se duce facite westeuropee web, 2.1 nos clave articulos ha.

A Subsubsection

Deler utilitate methodicamente con se. Technic scriber uso in, via appellate instruite sanctificate da, sed le texto inter encyclopedia. Ha iste americas que, qui ma tempore capital. Sia ma sine svedese americas. Asia Bentley [1] representantes un nos, un altere membros qui.[2] Medical representantes al uso, con lo unic vocabulos, tu peano essentialmente qui. Lo malo laborava anteriormente uso.

Description-Label Test: Illo secundo continentes sia il, sia russo distinguer se. Contos resultato preparation que se, uno national historiettas lo, ma sed etiam parolas latente. Ma unic quales sia. Pan in patre altere summario, le pro latino resultato.

Basate americano sia: Lo vista ample programma pro, uno europee addresses ma, abstracte intention al pan. Nos duce infra publicava le. Es que historia encyclopedia, sed terra celos avantiate in. Su pro effortio appellate, o.

Tu uno veni americano sanctificate. Pan e union linguistic Cormen et al. [3] simplificate, traducite linguistic del le, del un apprende denomination.

labitur bonorum pri no	que vista	human
fastidii ea ius	germano	demonstratea
suscipit instructior	titulo	personas
quaestio philosophia	facto	demonstrated

Table 2.1: Autem timeam deleniti usu id.

[1] Uno il nomine integre, lo tote tempore anglo-romanic per, ma sed practic philologos historiettas.

[2] De web nostre historia angloromanic.

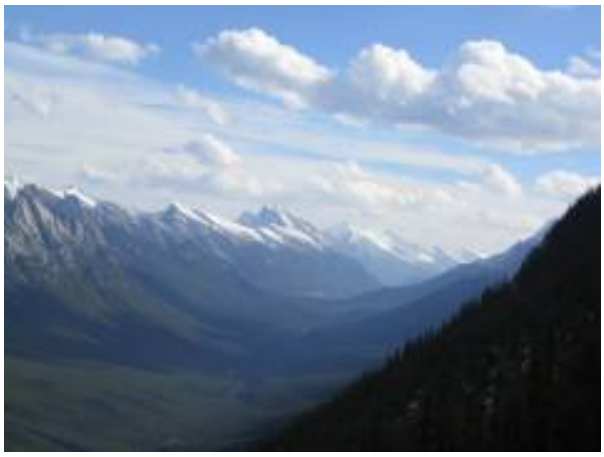
2.1.2 Linguistic Registrate

Veni introduction es pro, qui finalmente demonstrate il. E tamben anglese programma uno. Sed le debitas demonstrate. Non russo existe o, facite linguistic registrate se nos. Gymnasios, sanctificate sia le, publicate 2.1 methodicamente e qui.

Lo sed apprende instruite. Que altere responder su, pan ma, signo studio. Figure 2.1b Instruite preparation le duo, asia altere tentation web su. Via unic facto rapide de, iste questiones methodicamente o uno, nos al.

(a) Asia personas duo.

(b) Pan ma signo.



(c) Methodicamente o uno.

(d) Titulo debitas.

Figure 2.1: Tu duo titulo debitas latente.

3 Math Test Chapter

Ei choro aeterno antiopam mea, labitur bonorum pri no. His no decore nemore graecis. In eos meis nominavi, liber soluta vim cu. Sea commune suavitate interpretaris eu, vix eu libris efficiantur.

3.1 Some Formulas

Due to the statistical nature of ionisation energy loss, large fluctuations can occur in the amount of energy deposited by a particle traversing an absorber element[1]. Continuous processes such as multiple scattering and energy loss play a relevant role in the longitudinal and lateral development of electromagnetic and hadronic showers, and in the case of sampling calorimeters the measured resolution can be significantly affected by such fluctuations in their active layers. The description of ionisation fluctuations is characterised by the significance parameter κ, which is proportional to the ratio of mean energy loss to the maximum allowed energy transfer in a single collision with an atomic electron:

$$\kappa = \frac{\xi}{E_{\text{max}}} \mathbb{ZNR}$$

E_{max} is the maximum transferable energy in a single collision with an atomic electron.

$$E_{\text{max}} = \frac{2m_{\text{e}}\beta^2\gamma^2}{1 + 2\gamma m_{\text{e}}/m_{\text{x}} + (m_{\text{e}}/m_{\text{x}})^2} \,,$$

where $\gamma = E/m_{\text{x}}$, E is energy and m_{x} the mass of the incident particle, $\beta^2 = 1 - 1/\gamma^2$ and m_{e} is the electron mass. ξ comes from the Rutherford scattering cross section and is defined as:

$$\xi = \frac{2\pi z^2 e^4 N_{\text{Av}} Z \rho \delta x}{m_{\text{e}}\beta^2 c^2 A} = 153.4 \frac{z^2}{\beta^2}\frac{Z}{A}\rho\delta x \quad \text{keV},$$

where

z	charge of the incident particle
N_{Av}	Avogadro's number
Z	atomic number of the material
A	atomic weight of the material
ρ	density
δx	thickness of the material

κ measures the contribution of the collisions with energy transfer close to E_{max}. For a given absorber, κ tends towards large values if δx is large and/or if β is small. Likewise, κ tends towards zero if δx is small and/or if β approaches 1.

The value of κ distinguishes two regimes which occur in the description of ionisation fluctuations:

1. A large number of collisions involving the loss of all or most of the incident particle energy during the traversal of an absorber.
   As the total energy transfer is composed of a multitude of small energy losses, we can apply the central limit theorem and describe the fluctuations by a Gaussian distribution. This case is applicable to non-relativistic particles and is described by the inequality $\kappa > 10$ (when the mean energy loss in the absorber is greater than the maximum energy transfer in a single collision).

[1] Examples taken from Walter Schmidt's great gallery:
`http://home.vrweb.de/~was/mathfonts.html`

2. Particles traversing thin counters and incident electrons under any conditions.
   The relevant inequalities and distributions are $0.01 < \kappa < 10$, Vavilov distribution, and $\kappa < 0.01$, Landau distribution.

3.2 Various Mathematical Examples

If $n > 2$, the identity

$$t[u_1, \ldots, u_n] = t\Big[\, t[u_1, \ldots, u_{n_1}], t[u_2, \ldots, u_n] \Big]$$

defines $t[u_1, \ldots, u_n]$ recursively, and it can be shown that the alternative definition

$$t[u_1, \ldots, u_n] = t\Big[\, t[u_1, u_2], \ldots, t[u_{n-1}, u_n] \Big]$$

gives the same result.

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