SAPIENZA
UNIVERSITÀ DI ROMA

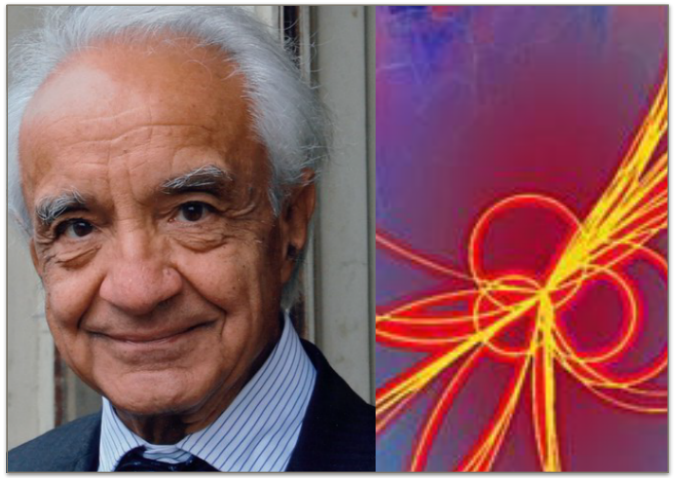
CONFERENZE E INCONTRI
FACOLTÀ DI INGEGNERIA CIVILE E INDUSTRIALE

INgegneria INcontra

Antonino Zichichi

L'unificazione delle forze fondamentali e il supermondo

10 ottobre 2019, 19:00 - 20:00
Aula 1 - Facoltà di Ingegneria*



Il nostro mondo ha le sue radici in uno spazio-tempo con 4 Dimensioni. Il Supermondo ha le sue radici in uno spazio-tempo con 43 Dimensioni: 11 di natura BOSONICA, e 32 di natura FERMIONICA. Ne illustreremo i dettagli. Il fascino di questa nuova frontiera della scienza sta in quanto segue: se esiste la luce deve esistere la Superluce. Se esiste l'elettrone deve esistere il Superelettrone e così per le altre componenti del nostro mondo in cui le pietre cadono sempre dall'alto verso il basso, grazie alla colla gravitazionale (detta gravitone) che tiene la Terra legata al Sole, il Sole alla Galassia e la Galassia a fare l'Universo. Se esiste il Gravitone, deve esistere anche il Supergravitone. È affascinante immaginare come apparirebbe il nostro Universo se fossimo noi stessi nel Supermondo.

In collaborazione con la Presidenza Nazionale dei Convegni di Cultura Maria Cristina di Savoia

* via Eudossiana 18 http://www.ing.uniroma1.it/drupal/ seguici su facebook

A.A 2019-2020

Multidisciplinary laboratory of electronics

I part (6 CFU)

II part (9 CFU)

Multidisciplinary laboratory of electronics (6 CFU)

Prof. Andrea Mostacci
Prof. Stefano Pisa

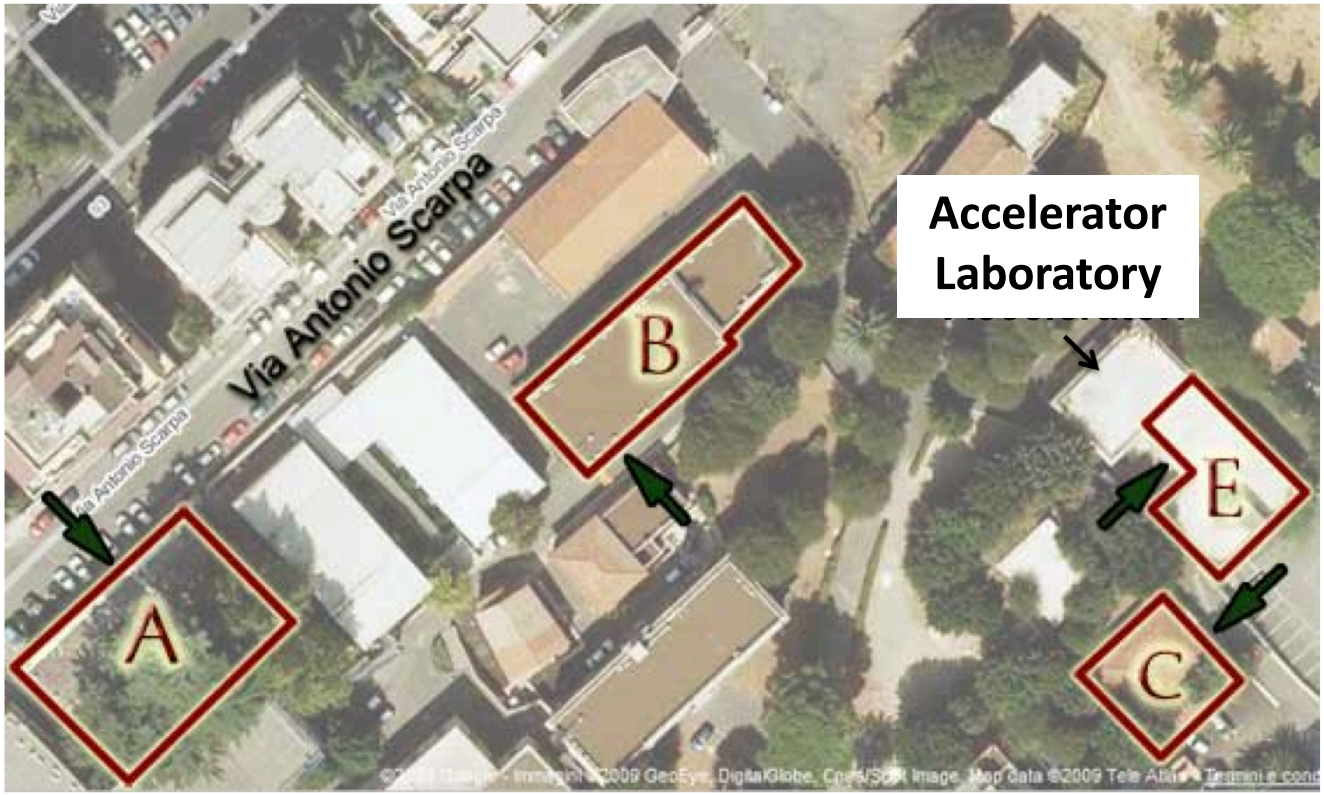
Web-site

http://arpg-serv.ing2.uniroma1.it/mostacci/didattica/lab-elettronica-I/

Lectures

Wedensday 14:30-18:30, SBAI lecture room
Accelerator Laboratory Via Scarpa

Thursday 14:30-18:30, SBAI conference room
Accelerator Laboratory Via Scarpa



Goal of the class

Being able to choose the instrument and its settings most appropriate to measure the device under test with the measurement uncertainty required.

Being able to measure typical microwave component with 1-port, 2-ports, 3-ports, 4-ports.

Basic modelling of RF devices.

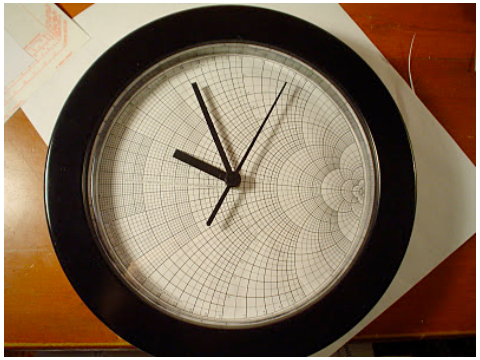
Getting acquainted with state of the art Vector Network Analysers (VNA) and Spectrum Analysers (SPA) and with fundamentals of microwave measurements.

Theoretical part	Laboratory part
III + I week	**VIII hands-on experiments**
Attending is strongly suggested	**4h – max 3-people groups**
	Attending is compulsory

Evaluation/Final mark: group reports + individual exam

Class timeline

Lectures



25 September	Introduction and RF fundamentals
26 September	Resonant cavities
2 October	Network Analysers
3 October	Time domain reflectometry
9 October	Spectrum analysers and field measurements
10 October	RF models and practical notes

Laboratory experiments

23 October– 12 December
1 afternoon every week
(Tuesday) Mercoledì o Giovedì
Report ready before the next experiment

Lectures

18-19 December

Seminar with industry
LNF visit
Conclusion and suggestions for exam

INFN Istituto Nazionale di Fisica Nucleare

GIAKOVA YOUR TECHNICAL TEAM

KEYSIGHT TECHNOLOGIES

ROHDE&SCHWARZ

Visit to Laboratori Nazionali di Frascati -INFN

WEB site

SAPIENZA
UNIVERSITÀ DI ROMA

DIPARTIMENTO DI SCIENZE DI BASE
E APPLICATE PER L' INGEGNERIA

Cerca vai

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- Mathematical Models for Engineering, Electromagnetics and Nanosciences
- Information and instructions
- Regulations on Student Representation
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Nome utente *

Password *

Quali caratteri sono presenti nell'immagine? *

Inserire i caratteri presenti.

Accedi

Home

LABORATORIO MULTIDISCIPLINARE DI ELETTRONICA I - INGEGNERIA ELETTRONICA (A.A. 2018-2019)

Anno Accademico:
2018-2019

Corso di Laurea:
Ingegneria Elettronica

Tipo Classe di Laurea:
Magistrale

Materia:
Laboratorio Multidisciplinare di Elettronica I

Canale (lettera iniziale):
A

Canale (lettera finale):
Z

Orario di ricevimento: su appuntamento

Luogo ricevimento: Dipartimento SBAI, sezione di Fisica

Periodo di erogazione del corso: I semestre

Programma: Programma2014-15.pdf

Note:

Il modulo è tenuto con il **prof. S. Pisa** (pisa@die.uniroma1.it).

È disponibile l'orario dettagliato nella sezione link (in continuo aggiornamento)

Materiale didattico e altre informazioni sono disponibili sul sito riportato di seguito.

Link esterni:
- Orario (aggiornamento continuo)
- Lezioni A.A. 2018-2019 (in continuo aggiornamento)
- Matlab Official Training (studenti Sapienza)
- Laboratorio di Misure ad Alta Frequenza
- Foto dei dispositivi usati nelle esercitazioni
- Materiale didattico (versione estesa)
- Zibaldone (F. Caspers, CERN)

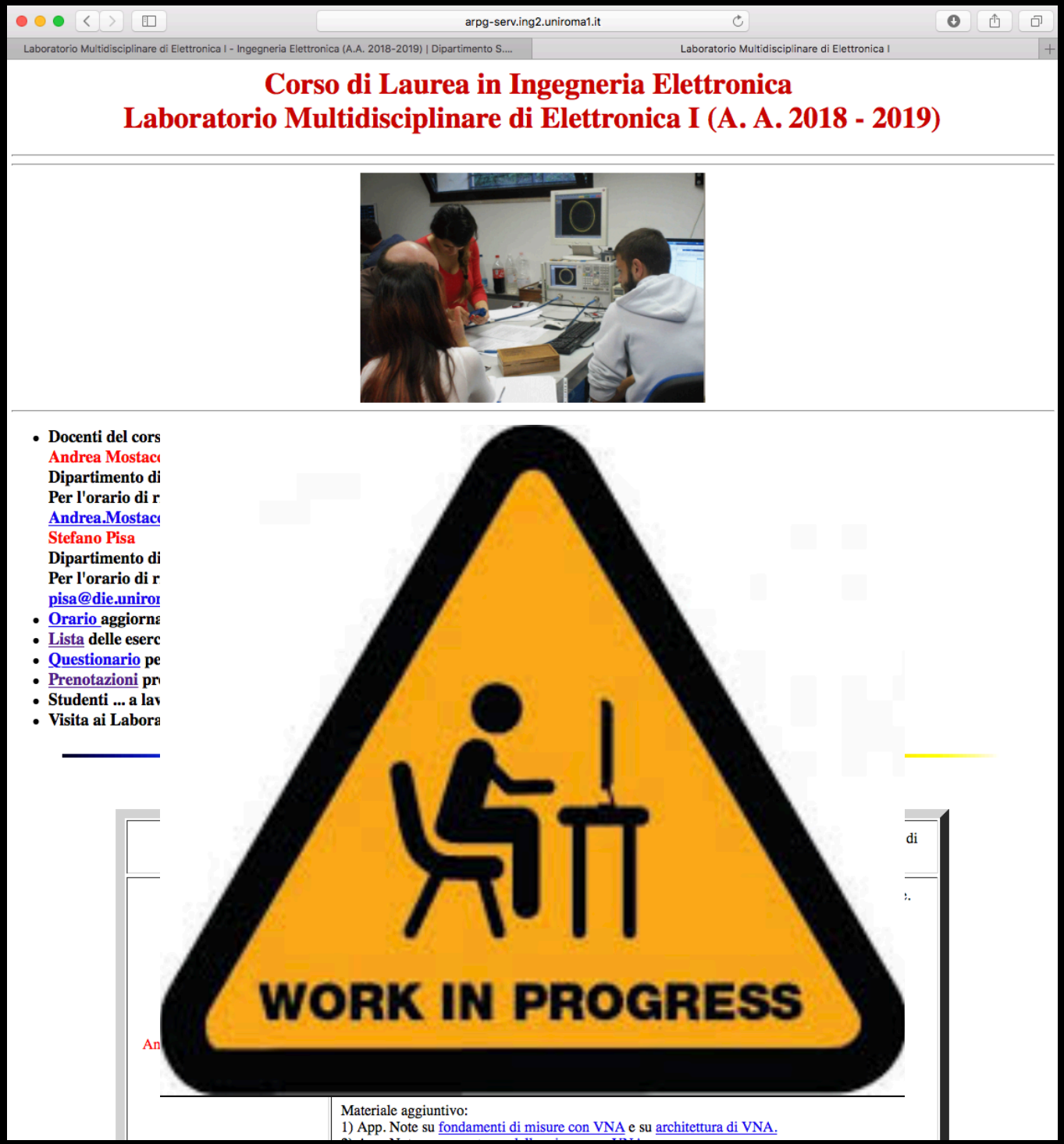
Dispense:

Esami:

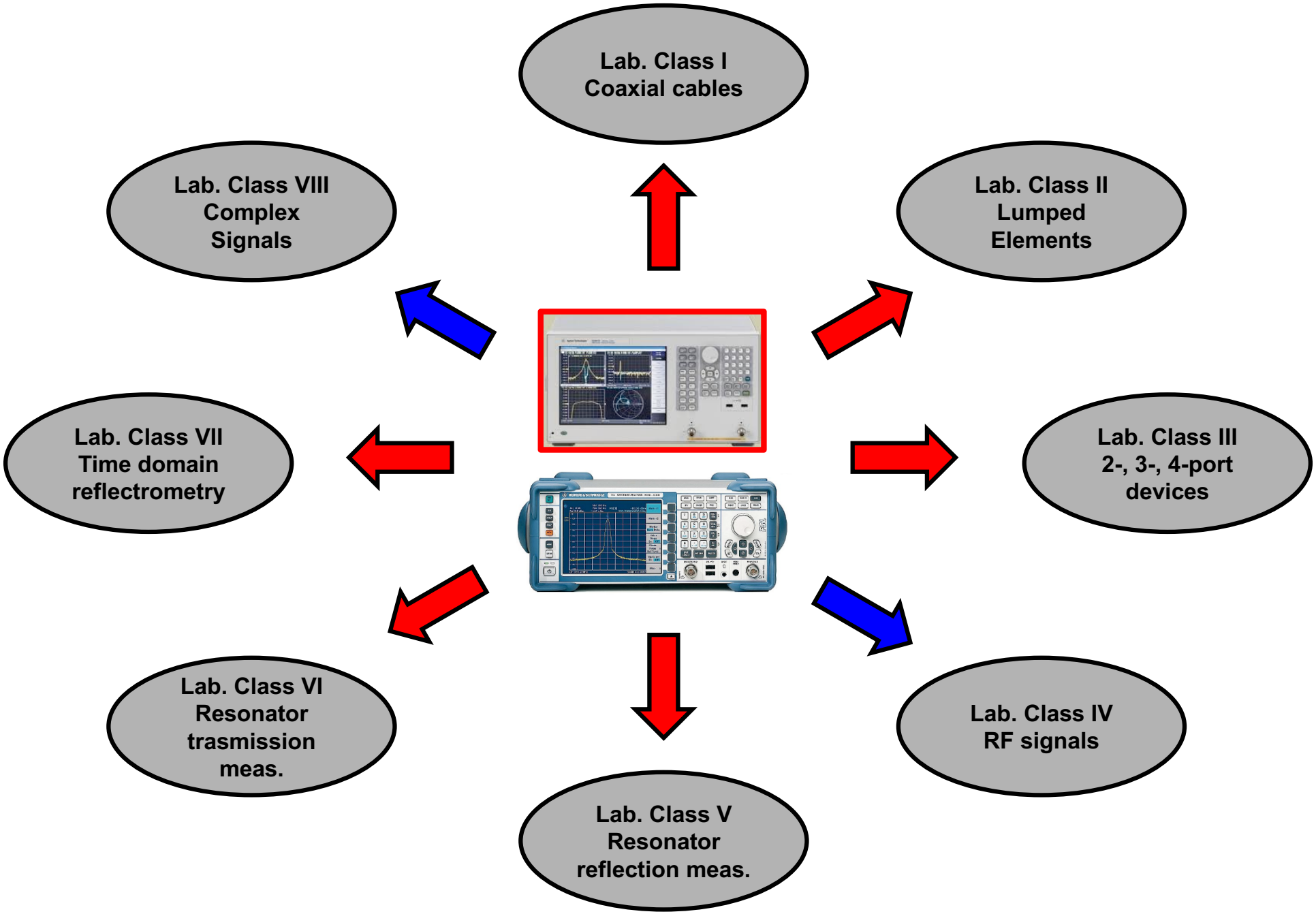
Presentazioni:

Altro:

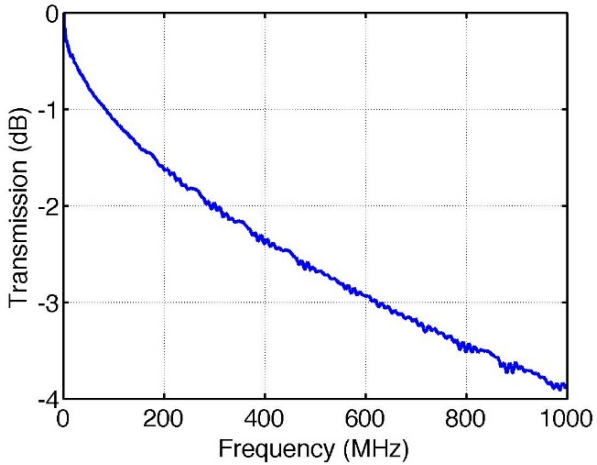
WEB site


arpg-serv.ing2.uniroma1.it
Laboratorio Multidisciplinare di Elettronica I - Ingegneria Elettronica (A.A. 2018-2019) | Dipartimento S....
Laboratorio Multidisciplinare di Elettronica I
Corso di Laurea in Ingegneria Elettronica
Laboratorio Multidisciplinare di Elettronica I (A. A. 2018 - 2019)
Docenti del cors
Andrea Mostac
Dipartimento di
Per l'orario di r
Andrea.Mostac
Stefano Pisa
Dipartimento di
Per l'orario di r
pisa@die.unirom
Orario aggiorna
Lista delle eserc
Questionario pe
Prenotazioni pr
Studenti ... a lav
Visita ai Labora
WORK IN PROGRESS
Materiale aggiuntivo:
1) App. Note su fondamenti di misure con VNA e su architettura di VNA.

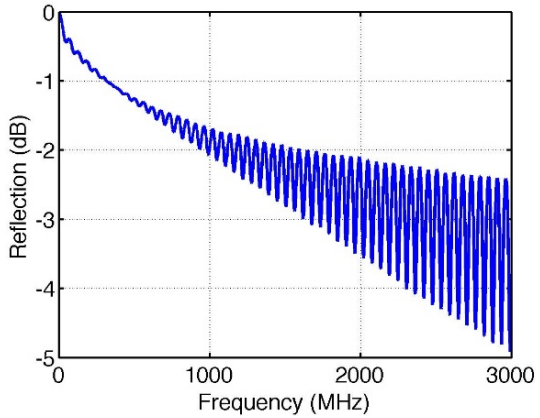
Detailed program of laboratory classes


Lab. Class I
Coaxial cables
Lab. Class II
Lumped
Elements
Lab. Class III
2-, 3-, 4-port
devices
Lab. Class IV
RF signals
Lab. Class V
Resonator
reflection meas.
Lab. Class VI
Resonator
trasmission
meas.
Lab. Class VII
Time domain
reflectrometry
Lab. Class VIII
Complex
Signals

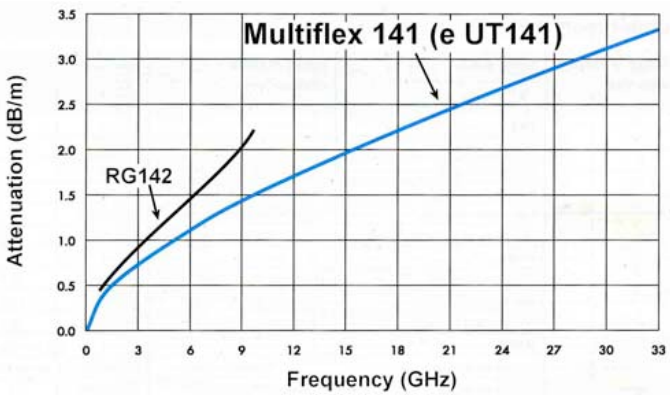
Lab. Class I
Cavi Coassiali



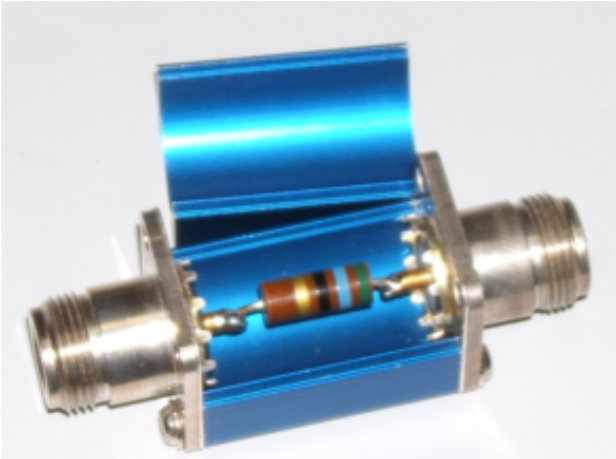
Lab. Class II
Lumped
Elements

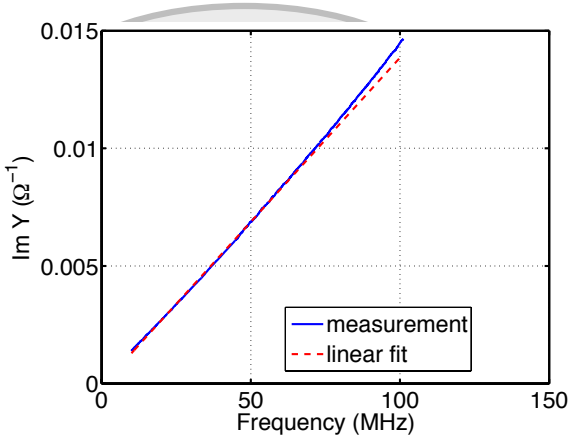


Lab. Class VII
Time domain
reflectometry



Lab. Class IV
RF signals





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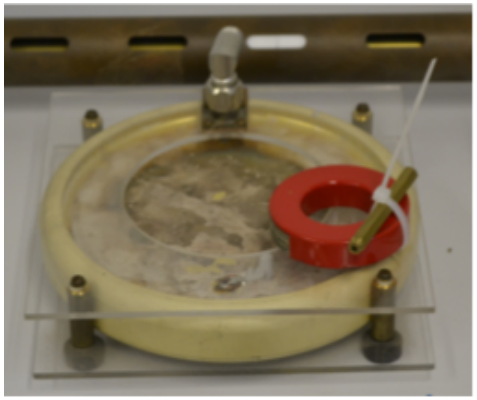
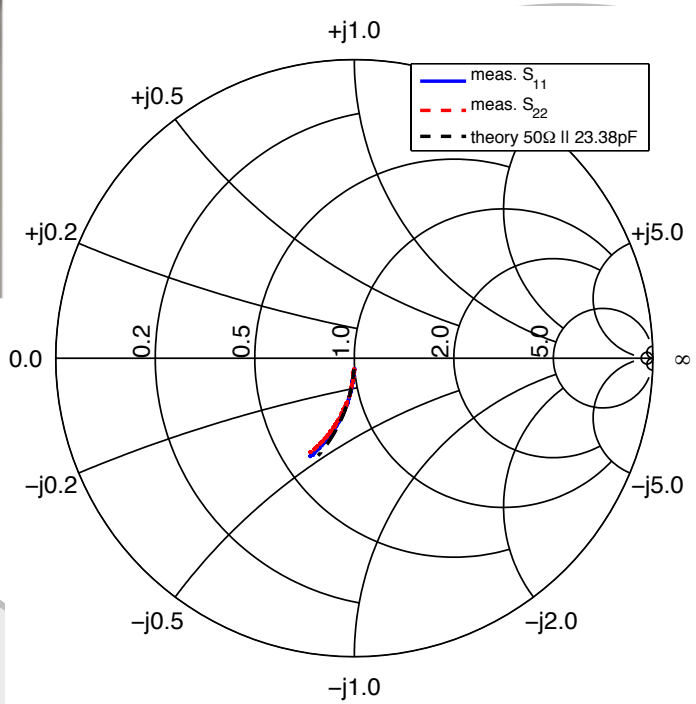
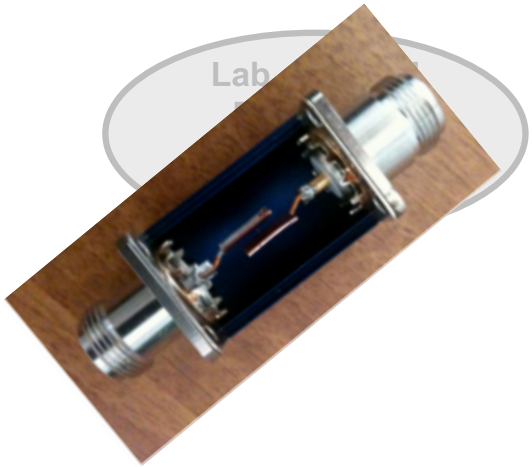
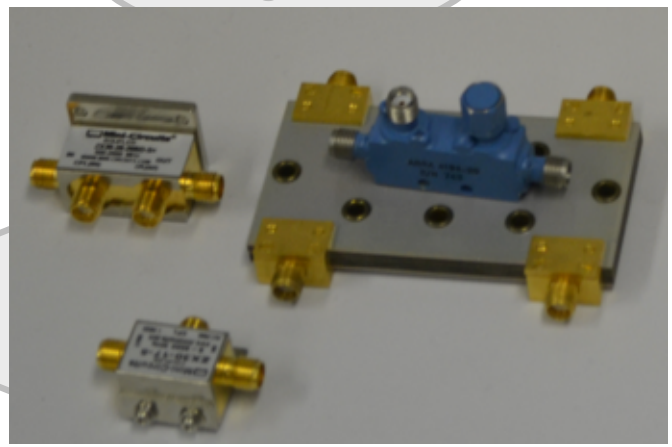
Lumped
Elements

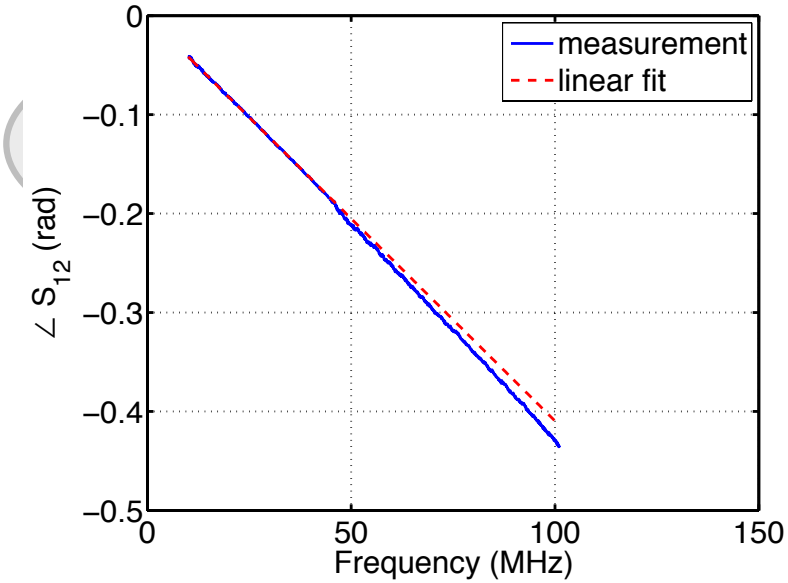




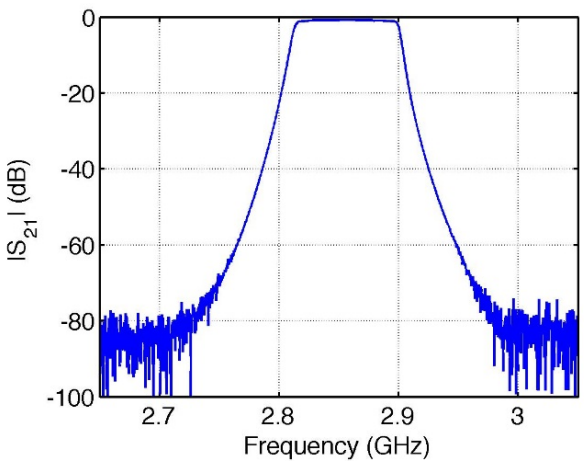


Lab. Class V
Resonator
reflection meas.

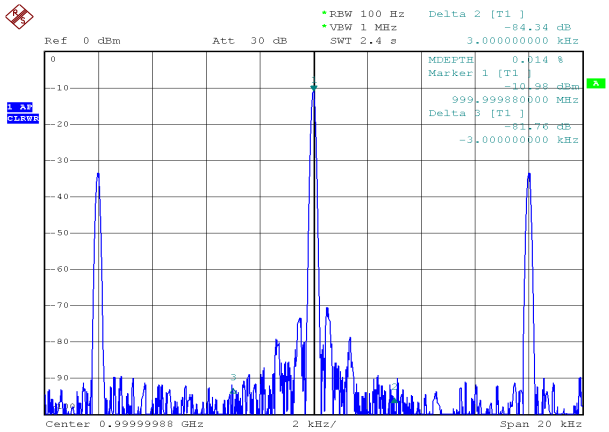




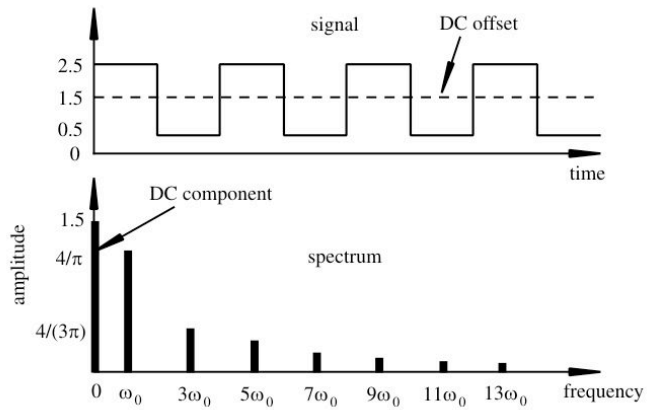
Lab. Class III
2-, 3-, 4-port devices

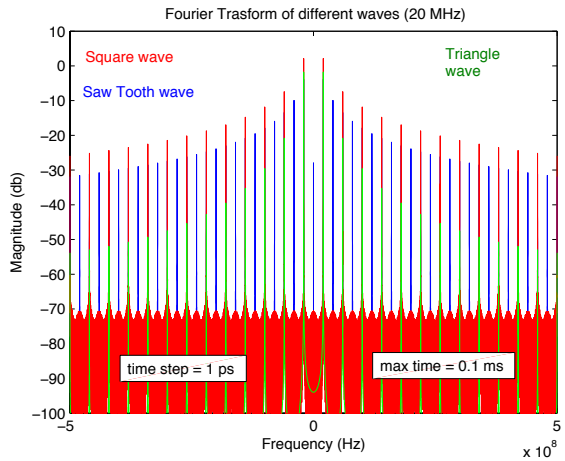


Lab. Class I
avi Coassiali



Lab. Class VII
Time domain
reflectrometry



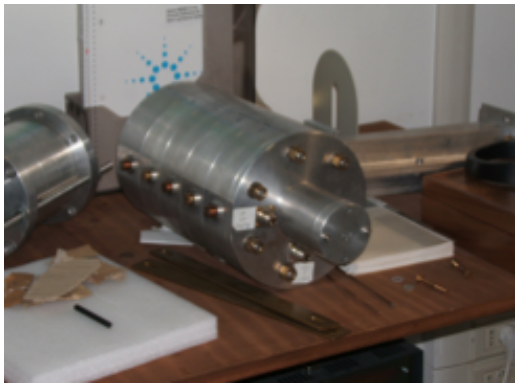


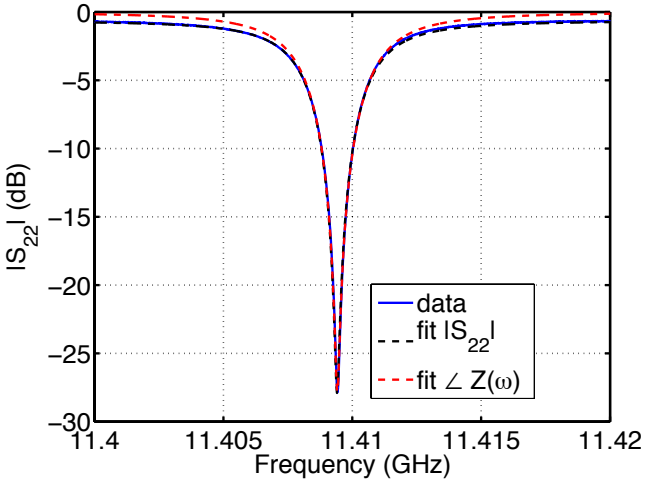
Lab. Class III
2-, 3-, 4-port
devices

Lab. Class IV
RF signals

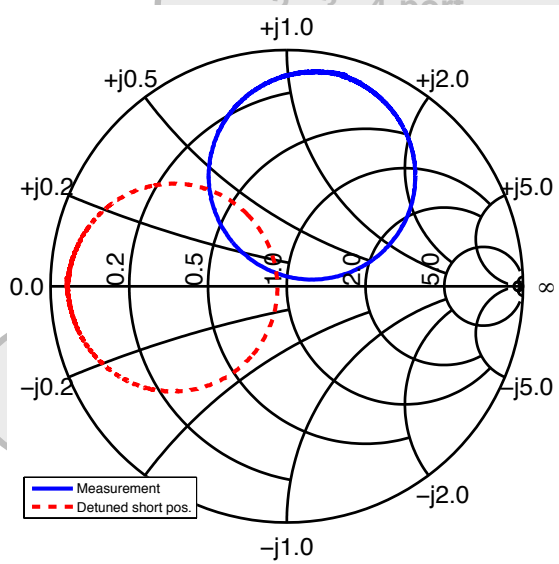
Lab. Class V
Resonator
reflection meas.

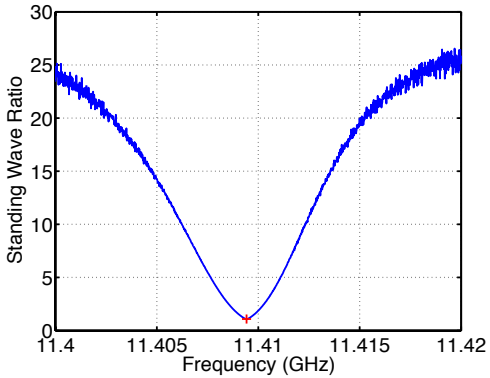
Lab. Class VII
Time domain
reflectometry



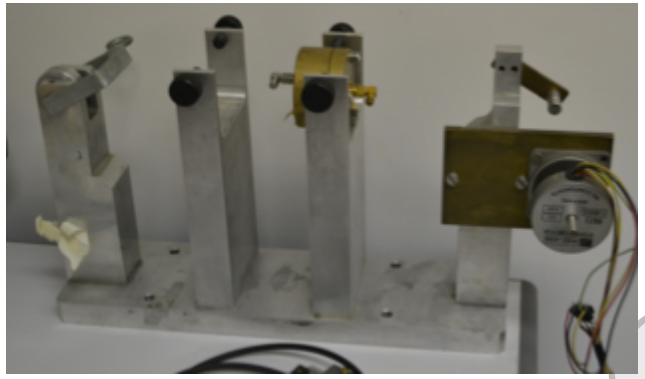


Lab. Class III

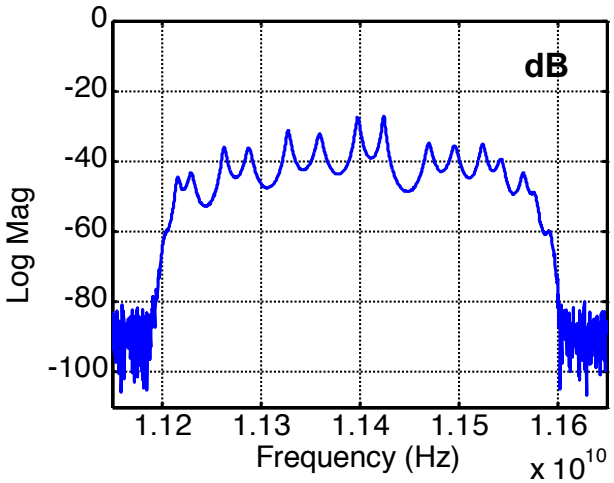




Lab. Class V
Resonator
reflection meas.



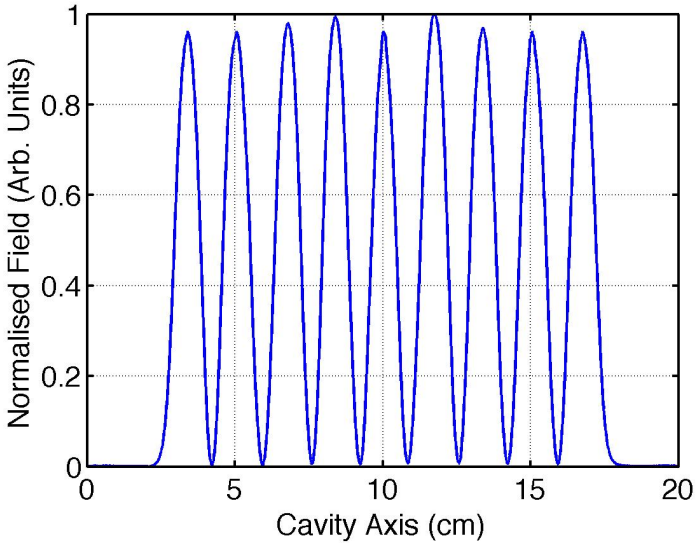
Lab. Class VII
Time domain
reflectrometry

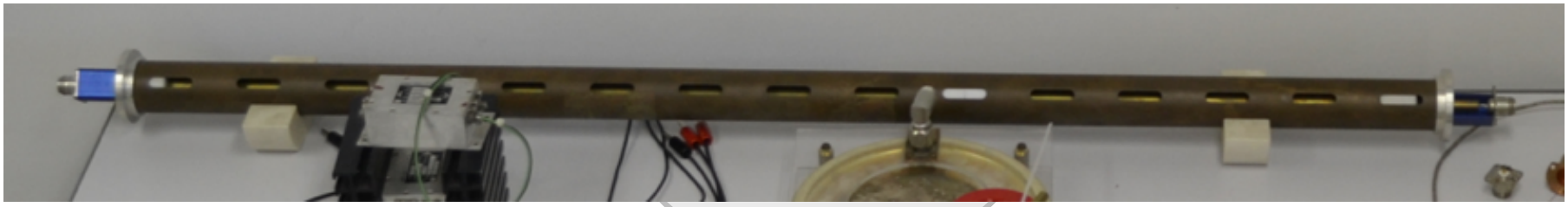


Lab. Class III
2-, 3-, 4-port
devices

Lab. Class VI
Resonator
trasmission
meas.

Lab. Class V
Resonator
reflection meas.





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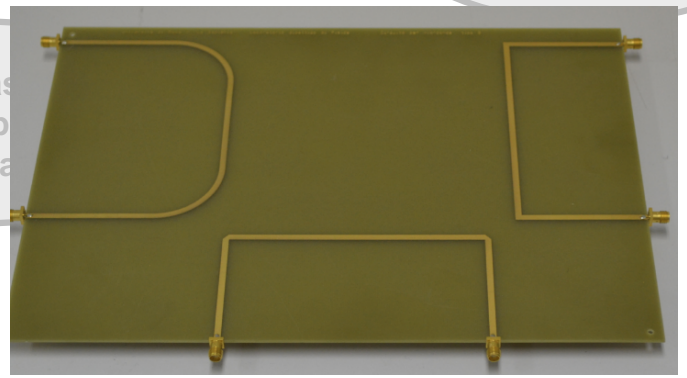
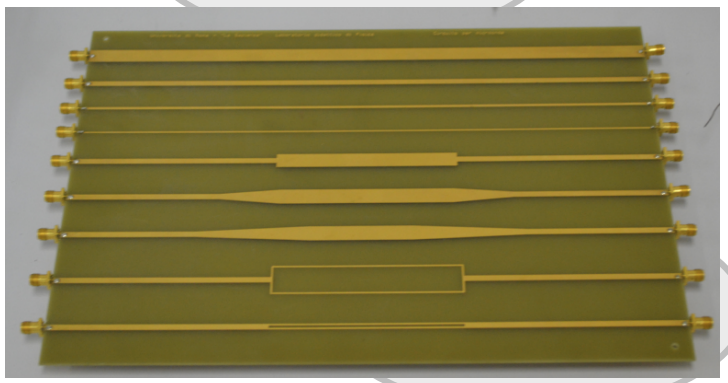
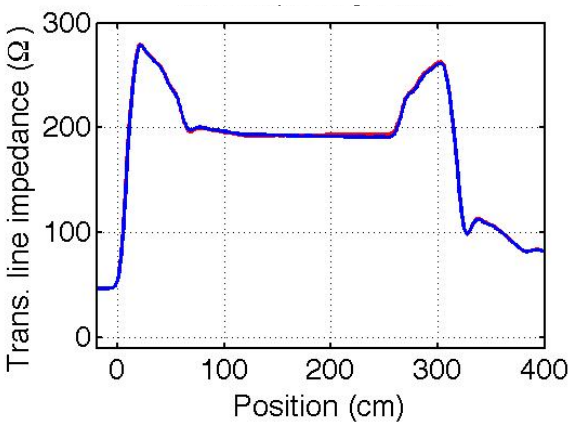


Lab. Class II
Lumped
Elements

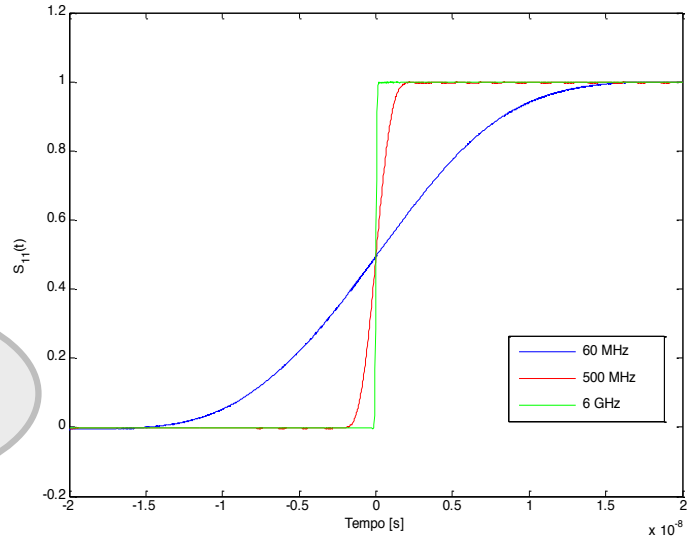


Lab. Class VII
Time domain
reflectometry

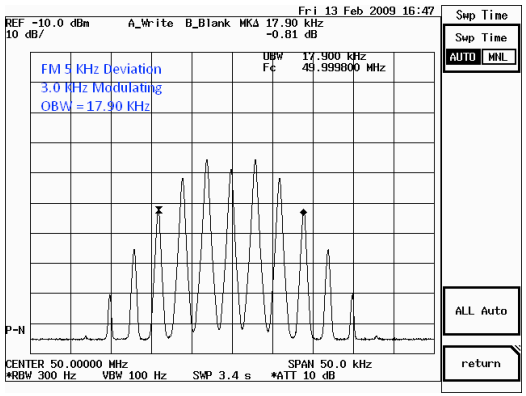
Lab. Class VI
Resonator
trasmission
meas.

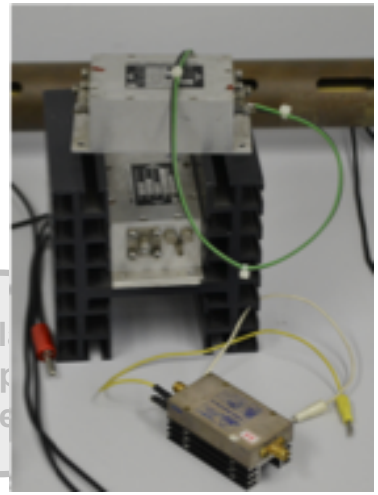


Lab. Class V
Resonator
reflection meas.



Lab. Class VIII
Complex
Signals





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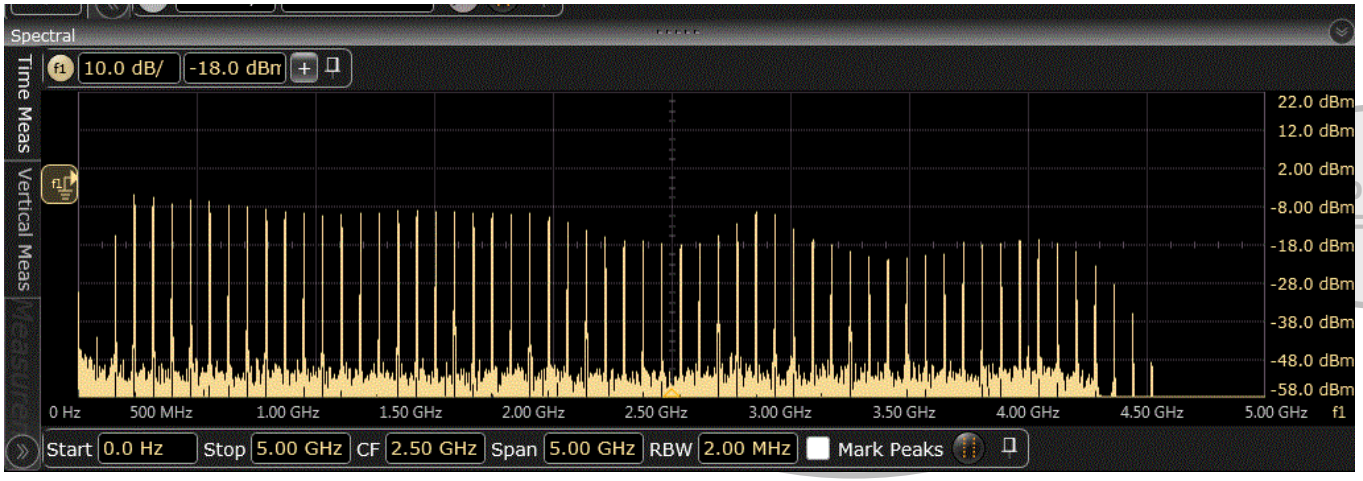
Lab. Class VII
Time domain
reflectrometry

. Class IV
F signals



References

Lecture notes:
See course website

Instrument manuals
Agilent, Rhode&Schwartz, Anritsu, Kethley, LeCroy, Tektronix, …

Measurement set-ups and introductory concepts (e.g. back to basics):
Application notes from Agilent, Rhode&Schwartz, Anritsu, Kethley, LeCroy, TekTronics, …

Device specs, applications, configurations, test-sets:
Application notes from Minicircuits, Narda, HUBER+SUHNER, …

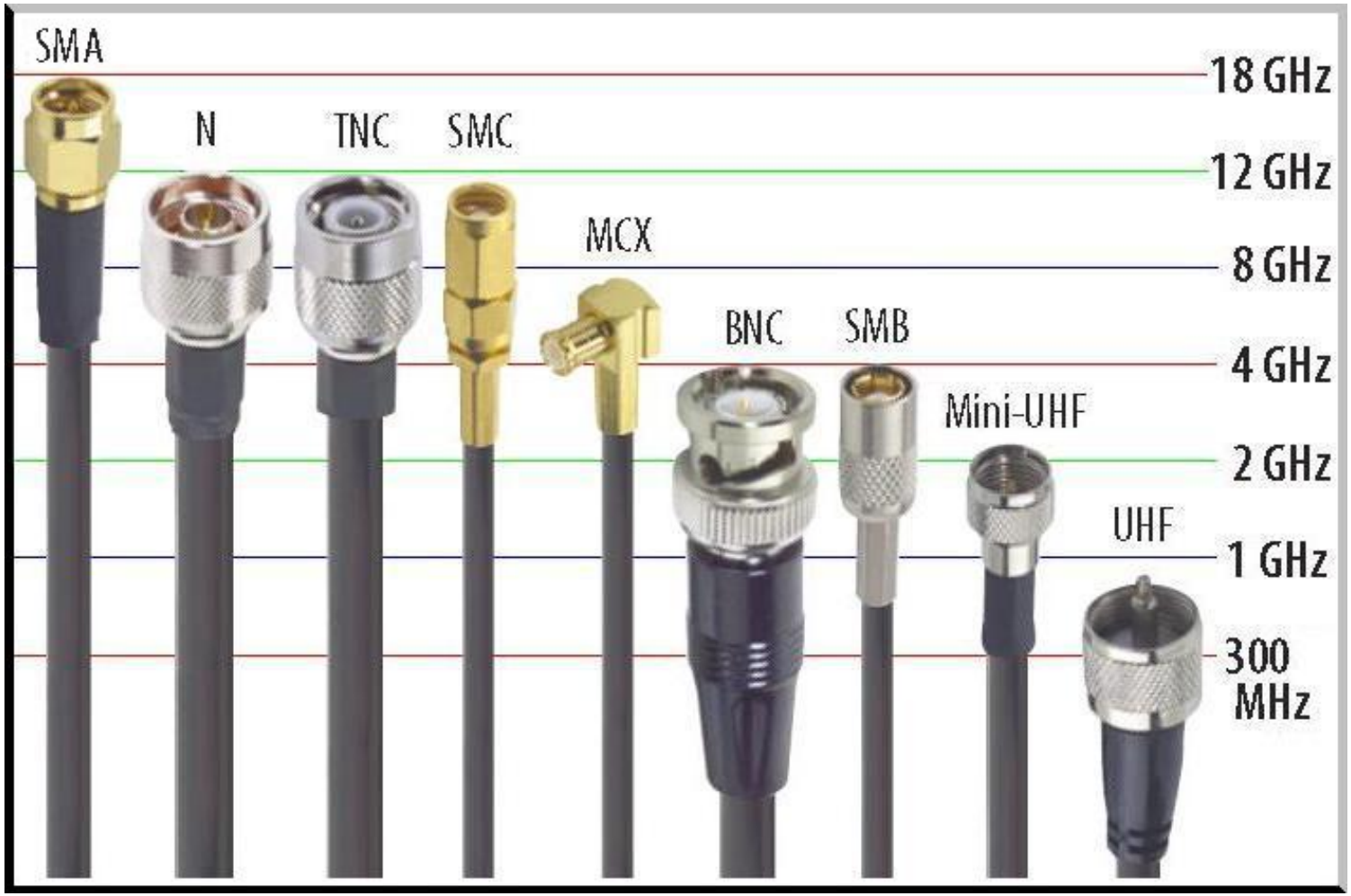
Web Sites:
RFcafe, RFglobalnet,, …

Sistemi a microonde

Denominazioni	Intervallo di frequenza GHz (10^9 Hz)
HF	0.003 - 0.030
VHF	0.030 - 0.300
UHF	0.300 - 1.000
Banda L	1.000 - 2.000
Banda S	2.000 - 4.000
Banda C	4.000 - 8.000
Banda X	8.000 - 12.000
Banda Ku	12.000 - 18.000
Banda K	18.000 - 26.500
Banda Ka	26.500 - 40.000
Banda Q	40.000 - 50.000
Banda V	50.000 - 75.000
Millimetrico	40.000 - 300.000

Cavi per microonde

Connettori (I)



Connettori (I)

TABLE 6.10 Common Coaxial Connectors

Connector Type	Cutoff Frequency	Mating Torque
BNC	4.0 GHz	N/A
SMB	4 GHz	N/A
SMC	10 GHz	30–50 in-oz
TNC	15 GHz	12–15 in-lbs
Type-N	18 GHz	12–15 in-lbs
7 mm	18 GHz	12–15 in-lbs
SMA	18 GHz	7–10 in-lbs
3.5 mm	26.5 GHz	7–12 in-lbs
2.9 mm	46 GHz	8–10 in-lbs
2.4 mm	50 GHz	8–10 in-lbs

Better to have a …

Suggestions/remarks

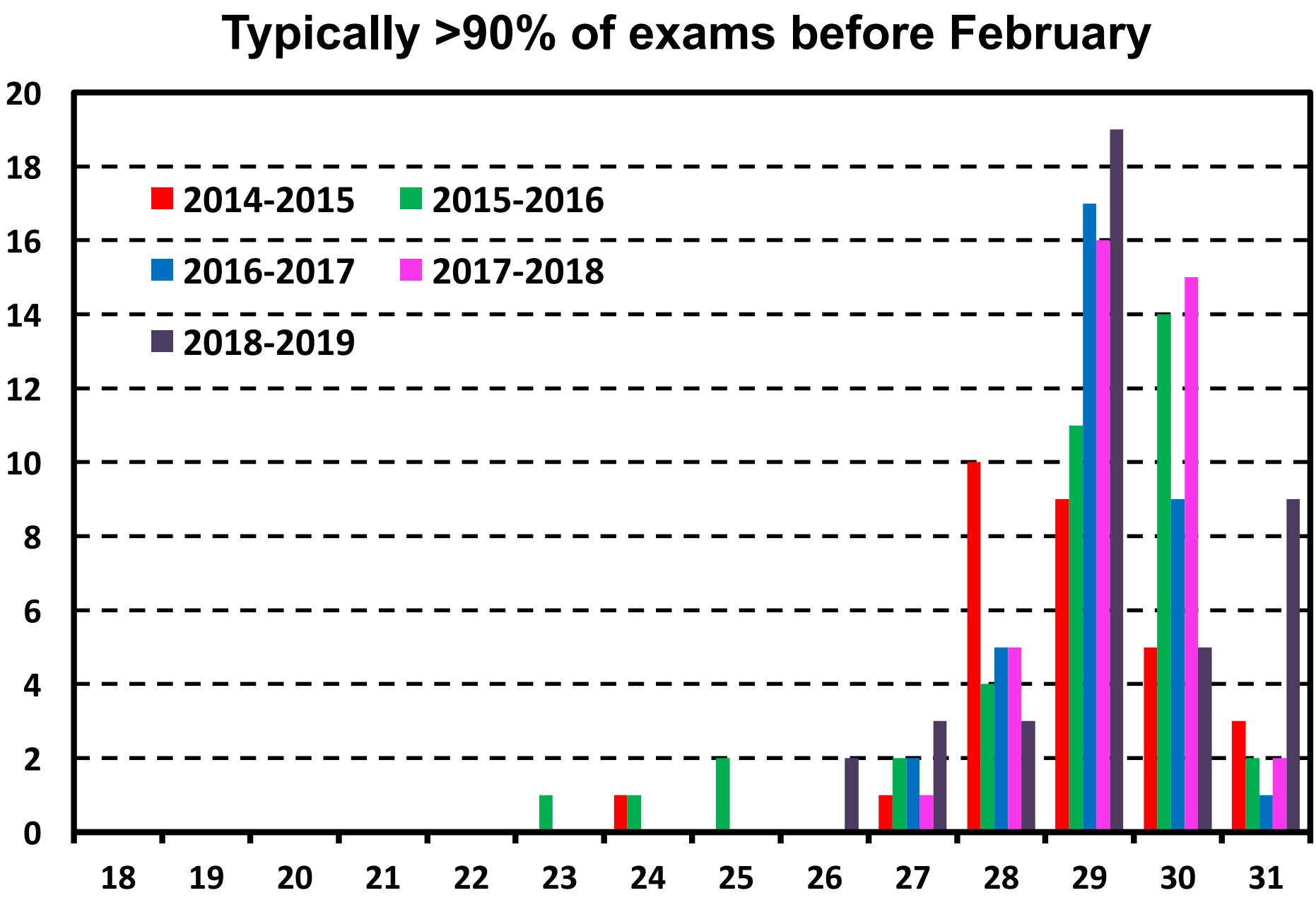
Most of the concepts are common to other classes.

The goal of the practical part is to get acquainted with instruments.

Use lectures to revise basic concepts (do not do it during the practical part).

Have a look before to the hands-on exercises (use the web-site).

Results


Typically >90% of exams before February
2014-2015
2015-2016
2016-2017
2017-2018
2018-2019
0
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8
10
12
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Have fun …