

A.A. 2022/23: nuovo curriculum della Laurea Magistrale in Fisica

- **Fundamental Interactions: Theory and Experiment**
in sostituzione di Particle and Astroparticle Physics
- Articolato su 3 semestri
- 2 esami obbligatori FIS/01
- 2 esami obbligatori FIS/02
- 3 esami obbligatori, rispettivamente FIS/03, FIS/04 e MAT/07
- 1 esame a scelta FIS/01
- 1 esame a scelta FIS/02 (o FIS/05)
- 3 esami a scelta (FIS, MAT, INF...)

[Proposta nuovo curriculum LM-17]

Con questa proposta, gli studenti possono decidere all'inizio dell'ultimo anno, in fase di revisione dei piani formativi, se dare un taglio teorico o un taglio sperimentale al proprio piano di studi.

- In fase di presentazione agli studenti del curriculum Fundamental Interactions, sono stati suggeriti esempi dei 5 sottocurricula seguenti:
 - HEP sperimentale
 - HEP teorico
 - Gravità sperimentale
 - Gravità teorico
 - Sperimentale applicativo (fisica medica).

Fundamental Interactions curriculum, practical guide

Curriculum Fundamental Interactions : Theory and Experiment							
N.	Insegnamenti	CFU	anno	sem.	SSD	eng	ambito
1	Introduction to Quantum Field Theory	6	1	1	FIS/02	Y	caratt.
2	Condensed Matter Physics	6	1	1	FIS/03	Y	caratt.
3	Physics Laboratory I (propedeutic teaching to Physics Laboratory II)	6	1	1	FIS/01	Y	caratt.
4	Group Theory in Mathematical Physics	6	1	1	MAT/07	Y	aff.-int.
5	Theory of Fundamental Interactions	6	1	2	FIS/02	Y	caratt.
6	Particle Physics	6	1	2	FIS/04	Y	caratt.
7	Physics Laboratory II	9	1	2	FIS/01	Y	caratt.
8	English language	4	1	2		Y	AAF
9	Elective (within group A)	6	1/2	1/2	FIS/01	Y	caratt.
10	Elective (within group B)	6	1/2	1/2	FIS/02-05	Y	aff.-int.
11	Elective (within group C)	6	1/2	1/2		Y	aff.-int.
12	Elective (free choice)	6	1/2	1/2		Y	
13	Elective (free choice)	6	1/2	1/2		Y	
14	Internship	3	2	1		Y	AAF
15	Thesis Project	38	2	2		Y	AAF

CFU = number of credits

SSD: Settore Scientifico Disciplinare

- FIS: Physics course
 - FIS/01: experimental physics
 - FIS/02: theoretical physics
 - FIS/03: condensed matter physics
 - FIS/04: nuclear and subnuclear physics
 - FIS/05: astronomy and astrophysics
- MAT: Mathematics course

Three semesters.
Seven compulsory courses + five optional courses.

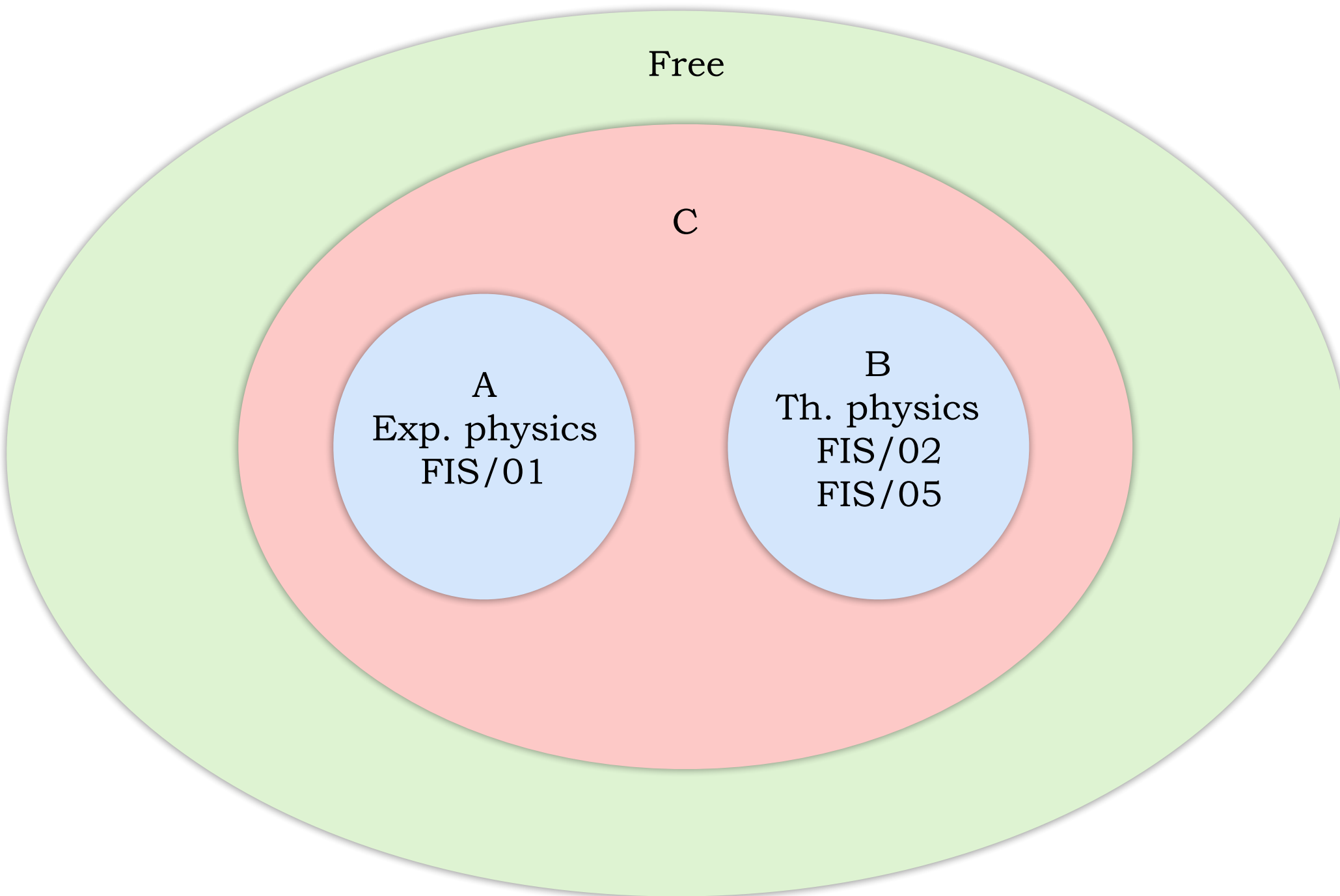
Mandatory courses

Compulsory courses of the curriculum

YEAR	SEMESTER	COURSE	SSD
1	1	Introduction to Quantum Field Theory (R. Bonciani or A. Polosa)	FIS/02
1	1	Condensed Matter Physics (S. Caprara or A. Polimeni)	FIS/03
1	1	Physics Laboratory I (G. Cavoto)	FIS/01
1	1	Group Theory in Mathematical Physics (G. Panati)	MAT/07
1	2	Theory of Fundamental Interactions (A. Urbano)	FIS/02
1	2	Particle Physics (S. Rahatlou)	FIS/04
1	2	Physics Laboratory II (G. Cavoto and E. Majorana)	FIS/01



[Decision Theory]



Choose in this order:
1) pick 1 from A and 1 from B
2) pick 1 from C
3) pick 2 from Free

**News for
2023/2024:
No need of 12 CFU
non-FIS**

[Gruppi A (FIS/01), B (FIS/02-05) e C]

Gruppo C (aff.-int.)		CFU	anno	sem.	SSD	
1	Computing Methods for Physics	6	1	1	INF/01	Pannarale
2	General Relativity (mutuato da LM-58)	6	1	1	FIS/02	P. Pani
3	Neural Networks	6	1	2	FIS/02	M. Mattia (ISS)
4	Advanced Machine Learning for Physics	6	1	2	INF/01	Giagu
5	Computer Architecture for Physics	6	1	2	INF/01	Biagioni/Lonardo (INFN)
6	Detectors and Accelerators in Particle Physics	6	1	2	FIS/01	Gauzzi
7	Mathematical Physics	6	1	2	MAT/07	Caglioti
8	Methods in Experimental Particle Physics	6	1	2	FIS/01	Di Domenico
9	Nuclear Physics	6	1	2	FIS/04	De Cecco
10	Gravitational Waves, Compact Stars and Black Holes	6	1	2	FIS/02	Pannarale / P. Pani
11	Physical Cosmology (mutuato da LM-58)	6	1	2	FIS/05	Melchiorri
12	Plasma Physics and Nuclear Fusion (mutuato da LM-30)	6	1	2	FIS/01	corso di Ingegneria Energetica

[Gruppi A (FIS/01), B (FIS/02-05) e C]

		CFU	anno	sem.	SSD	
13	Strong interactions and QCD	6	1	2	FIS/02	Polosa
14	Accelerator Physics and Relativistic Electrodynamics (mutuato da LM-29)	6	1	2	FIS/01	corso di Ingegneria Elettronica
15	Astroparticle Physics (mutuato da LM-58)	6	2	1	FIS/01	Di Palma
16	Collider Particle Physics	6	2	1	FIS/01	Luci
17	Experimental Gravitation (mutuato da LM-58)	6	2	1	FIS/01	Majorana / Leaci
18	Medical Applications of Physics	6	2	1	FIS/01	R. Pani/Saini (Patera/Saini dal 23/24)
19	Neutrinos and Dark Matter	6	2	1	FIS/01	Vignati
20	Quantum Field Theory	6	2	1	FIS/02	Papinutto
21	Solid State Sensors	6	2	1	FIS/01	Polimeni / Bocci (INFN)
22	Phenomenology of the Standard Model	6	2	1	FIS/02	Contino / Nardecchia
23	Laser Fundamentals (mutuato da LM-29, reserved for Lascala students only)	6	1	2	FIS/01	corso di Ingegneria Elettronica
24	Optics (mutuato da LM-29, reserved for Lascala students only)	6	1	2	FIS/01	corso di Ingegneria Elettronica

[Some suggestions..]

Particle Exp. (5+5+2)			
YEAR	SEMESTER	COURSE	SSD
1	1	Introduction to Quantum Field Theory (R. Bonciani or A. Polosa)	FIS/02
1	1	Condensed Matter Physics (S. Caprara or A. Polimeni)	FIS/03
1	1	Physics Laboratory I (G. Cavoto)	FIS/01
1	1	Group Theory in Mathematical Physics (G. Panati)	MAT/07
1	1	Computing Methods for Physics (F. Pannarale)	INF/01
1	2	Theory of Fundamental Interactions (A. Urbano)	FIS/02
1	2	Particle Physics (S. Rahatlou)	FIS/04
1	2	Physics Laboratory II	FIS/01
1	2	Detectors and Accelerators (P. Gauzzi) / Methods in Experimental Particle Physics (A. Di Domenico)	FIS/01
1	2	Strong Interactions and QCD (A. Polosa)	FIS/02
2	1	Neutrinos and Dark Matter (M. Vignati) / Astroparticle Physics (I. Di Palma)	FIS/01
2	1	Collider Particle Physics (C. Luci)	FIS/01

[Some suggestions..]

Particle Theory (5+4+3)			
YEAR	SEMESTER	COURSE	SSD
1	1	Introduction to Quantum Field Theory (R. Bonciani or A. Polosa)	FIS/02
1	1	Condensed Matter Physics (S. Caprara or A. Polimeni)	FIS/03
1	1	Physics Laboratory I (G. Cavoto)	FIS/01
1	1	Group Theory in Mathematical Physics (G. Panati)	MAT/07
1	1	Computing Methods for Physics (F. Pannarale)	INF/01
1	2	Theory of Fundamental Interactions (A. Urbano)	FIS/02
1	2	Particle Physics (S. Rahatlou)	FIS/04
1	2	Physics Laboratory II (G. Cavoto and E. Majorana)	FIS/01
1	2	Strong Interactions and QCD (A. Polosa)	FIS/02
2	1	Neutrinos and Dark Matter (M. Vignati) / Collider Particle Physics (C. Luci)	FIS/01
2	1	Phenomenology of the Standard Model (R. Contino, M. Nardecchia)	FIS/02
2	1	Quantum Field Theory (M. Papinutto)	FIS/02



[Some suggestions..]

Gravity Exp. (5+5+2)

YEAR	SEMESTER	COURSE	SSD
1	1	Introduction to Quantum Field Theory (R. Bonciani or A. Polosa)	FIS/02
1	1	Condensed Matter Physics (S. Caprara or A. Polimeni)	FIS/03
1	1	Physics Laboratory I (G. Cavoto)	FIS/01
1	1	Group Theory in Mathematical Physics (G. Panati)	MAT/07
1	1	General Relativity (P. Pani)	FIS/02
1	2	Theory of Fundamental Interactions (A. Urbano)	FIS/02
1	2	Particle Physics (S. Rahatlou)	FIS/04
1	2	Physics Laboratory II (G. Cavoto and E. Majorana)	FIS/01
1	2	Physical Cosmology (A. Melchiorri)	FIS/05
1	2	Advanced Machine Learning for Physics (S. Giagu) / Computer Architecture for Physics (Biagioni, Leonardo)	INF/01
2	1	Experimental Gravitation (P. Leaci, E. Majorana)	FIS/01
2	1	Astroparticle Physics (I. Di Palma) / Neutrinos and Dark Matter (M. Vignati)	FIS/01

[Some suggestions..]

Gravity Theory (5+5+2)			
YEAR	SEMESTER	COURSE	SSD
1	1	Introduction to Quantum Field Theory (R. Bonciani or A. Polosa)	FIS/02
1	1	Condensed Matter Physics (S. Caprara or A. Polimeni)	FIS/03
1	1	Physics Laboratory I (G. Cavoto)	FIS/01
1	1	Group Theory in Mathematical Physics (G. Panati)	MAT/07
1	1	General Relativity (P. Pani)	FIS/02
1	2	Theory of Fundamental Interactions (A. Urbano)	FIS/02
1	2	Particle Physics (S. Rahatlou)	FIS/04
1	2	Physics Laboratory II (G. Cavoto and E. Majorana)	FIS/01
1	2	Gravitational Waves, Compact Stars and BH (F. Pannarale, P. Pani)	FIS/02
1	2	Mathematical Physics (E. Caglioti)	MAT/07
2	1	Quantum Field Theory (Papinutto)	FIS/02
2	1	Experimental Gravitation (P. Leaci, E. Majorana)	FIS/01

Mathematical physics —> Physical cosmology

[Some suggestions..]

Astroparticle (5+5+2)

YEAR	SEMESTER	COURSE	SSD
1	1	Introduction to Quantum Field Theory (R. Bonciani or A. Polosa)	FIS/02
1	1	Condensed Matter Physics (S. Caprara or A. Polimeni)	FIS/03
1	1	Physics Laboratory I (G. Cavoto)	FIS/01
1	1	Group Theory in Mathematical Physics (G. Panati)	MAT/07
1	1	General Relativity (P. Pani)	FIS/02
1	2	Theory of Fundamental Interactions (A. Urbano)	FIS/02
1	2	Particle Physics (S. Rahatlou)	FIS/04
1	2	Physics Laboratory II (G. Cavoto and E. Majorana)	FIS/01
1	2	Physical Cosmology (A. Melchiorri)	FIS/02
1	2	Advanced Machine Learning for Physics (S. Giagu) / Computer Architecture for Physics (Biagioni, Leonardo)	INF/01
2	1	Neutrinos and Dark Matter (M. Vignati)	FIS/02
2	1	Astroparticle Physics (I. Di Palma)	FIS/01

[Some suggestions..]

Applied (5+5+2)			
YEAR	SEMESTER	COURSE	SSD
1	1	Introduction to Quantum Field Theory (R. Bonciani or A. Polosa)	FIS/02
1	1	Condensed Matter Physics (S. Caprara or A. Polimeni)	FIS/03
1	1	Physics Laboratory I (G. Cavoto)	FIS/01
1	1	Group Theory in Mathematical Physics (G. Panati)	MAT/07
1	1	Computing Methods for Physics (F. Pannarale)	INF/01
1	2	Theory of Fundamental Interactions (A. Urbano)	FIS/02
1	2	Particle Physics (S. Rahatlou)	FIS/04
1	2	Physics Laboratory II (G. Cavoto and E. Majorana)	FIS/01
1	2	Nuclear Physics (S. De Cecco)	FIS/04
1	2	Strong Interactions and QCD (A. Polosa)	FIS/02
2	1	Medical Applications of Physics (R. Pani and N. Saini)	FIS/01
2	1	Solid State Sensors (V. Bocci, A. Polimeni)	FIS/01

[Scelta piani formativi LM-17]

	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Biosistemi	 11%	 21%	 26%	 20%	 14%	 20%	 11%	 13%	 9%	 15%	 15%	 10%
Particelle	 25%	 12%	 15%	 17%	 22%	 15%	 23%	 26%	 28%	 14%	 22%	 28%
Struttura	 21%	 25%	 24%	 29%	 18%	 12%	 20%	 14%	 20%	 21%	 17%	 17%
Teorico	 43%	 43%	 35%	 34%	 46%	 53%	 46%	 47%	 43%	 50%	 46%	 44%
totale	102	117	110	137	133	137	149	159	158	155	157	166

Curriculum in lingua inglese

Il curriculum Particle and Astroparticle diventa
Fundamental Interactions: theory and experiments.

[Few final remarks...

- More information about ongoing researches in the **Scientific Report of Department of Physics** ([link](#)). Pages 97-159 dedicated to particle and astroparticle physics.
- Practical infos about courses:
<https://corsidilaurea.uniroma1.it/it/corso/2022/30055/programmazione>

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